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A Proposal For
TRANSPORT TEACHING AND RESEARCH
a joint submission to the
CANADIAN TRANSPORT COMMISSION
by
University of Toronto and York University

October 10, 1969

Toronto, Ontario

A Proposal for

TRANSPORT TEACHING AND RESEARCH

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CANADIAN TRANSPORT COMMISSION

by

The University of Toronto and York University

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The Hon. J.W. Pickersgill,
President,
Canadian Transport Commission,
Ottawa, Ontario.

Dear Mr. Pickersgill:

In response to your letter of June 30, 1969, we are pleased to submit to you a joint proposal for transport teaching and research programmes.

By combining the academic and research resources of our neighbouring institutions, we feel we are in a very strong position to advance research and teaching in the field of transport. We are delighted to have this opportunity, created by your initiative to join forces in such a creative endeavour. Together it should be possible for us to attain the highest standards of excellence.

We are in full agreement that our activities should not only provide immediate useable research results, but should also build up research capabilities and increase the numbers of trained people in the field. We would expect that, as is the case now, transport research would be an integral and productive part of graduate teaching. By combining the resources of our two institutions, as listed in our submission, we can augment the depth and breadth of our teaching programmes. In addition,

we plan to develop publication, seminars, general lectures, training schemes and public service work in the transport sphere. In general, we are prepared to assign high priority to collaborative transport activities at our two universities.

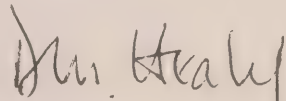
Considering the great size and pervasive influence of the transport sector in Canada, it may be said that both the universities and the public authorities have in the past, to some degree, neglected teaching and research in this area. There are claims from many fields of interest for scarce university resources. There must be evidence of definite public interest and solid, sustained financial support by government to persuade our best scholars and graduate students to work on transport problems.

From your initial letter to our two universities we are most hopeful that the Canadian Transport Commission will provide sustained support in this hitherto neglected field. The University of Toronto and York University stand ready to work creatively with you.

Yours sincerely,



CLAUDE BISSELL
President
The University of Toronto



DENNIS HEALY
Acting President and
Academic Vice-President
York University

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1. INTRODUCTION

It is estimated that the transport sector of the Canadian economy accounts for almost 20% of the Gross National Product. Canada moves about 40% more ton-miles of freight per dollar of G.N.P. than does the United States. These facts indicate the importance of transportation to Canada.

The new technological advances, the huge expansion of urban areas and of transport of all kinds involving people and goods, are creating complex problems which university teachers and researchers with special expertise are well equipped to perceive. Not only can they train experts, but they can also investigate broad systems phenomena, including the influence of transport upon socio-economic development within a city, region or nation.

1.1 Location

Metropolitan Toronto already has a population of two million and this figure may reach three million by 1980. It is one of the leading centres of Canada and of the North American continent. It is the site of the home offices of many large corporations and business associations, and is the focal point of many domestic and international air, rail, water and highway transport services. Toronto is a good location for research personnel who need to travel frequently and require access to library and research materials. Furthermore, because of its size and complexity, Toronto is already a laboratory for urban and regional transport studies and related research in the field of urban mobility.

1.2 The University of Toronto and York University

The various components of the University of Toronto and of York University, involved in transport training and research are highly complementary. They share desires to promote and produce advanced courses in transport; to achieve research results of significant importance to the solution of the complex challenges in the transport area, and to render public services through colloquia, publications and advisory activities. Collaboration, due to the sharing of objectives and proximity of location, is feasible and practicable. Also, consultations between executive groups of the two university transport groups lead to the conviction that the combination of the expertise of the University of Toronto transport specialists and those of York University will yield significant inter-disciplinary results. Given public support, advancement of transport teaching and research can be accomplished which will meet the highest international standards.

2. ACADEMIC STRENGTH

2.1 Advantages of Combined Academic Strength

This is an age of specialization. The engineer, the economist, the administrator, the physicist, the political scientist, the geographer, the urban or regional planner, the sociologist, the historian, are all concerned with the multi-faceted problems of transport. Interdisciplinary, interuniversity collaboration will facilitate the application of their specialized knowledge to the solution of transport problems.

The two universities putting forward this proposal clearly complement each other. The University of Toronto has a strong faculty of engineering, as well as great capabilities in the social sciences, planning, and urban studies. In addition there are several interdisciplinary centres and an interdepartmental programme in transportation systems.

York University has an innovative new Faculty of Environmental Studies, a Faculty of Administrative Studies comprising a School of Business Administration and a School of Public Administration with over 800 graduate students, strength in social science faculties, Osgoode Hall Law School with outstanding transportation law and policy teaching and research capabilities, and several interdisciplinary centres.

The cooperation that the University of Toronto and York University propose in this submission is designed to surmount traditional institutional constraints. This will allow the coordinated application of the indicated specialized expertise to the areas of teaching and research.

2.2 University of Toronto Academic Strength

Interests and capabilities in transport teaching and research at the University of Toronto are found in a wide range of disciplines, representing the three faculties of Arts and Science, Applied Science and Engineering, and Architecture, Urban and Regional Planning, and Landscape Architecture. A brief summary of the qualifications and interests of the staff members with transport research involvement is given below, with further details being available in Appendix I. It should be noted that this listing does not represent a commitment to perform research by the individual staff members, but reflects only their interest in transport teaching and research.

ALAN ABOUCHAR: B.A.(N.Y.), A.M.(N.Y.), M.A.(Berkeley), Ph.D.(Berkeley)

Associate Professor, Department of Political Economy

Research Associate, Institute for the Quantitative Analysis of Social and Economic Analysis

Professional experience and interests: analysis of transportation investments and user charges, development and application of criteria for transport decision-making, and external economics of transportation.

BEN BERNHOLTZ: B.A., M.A., Ph.D.(Cal.Tech.)

Chairman, Department of Industrial Engineering

Professional experience and interests: queueing theory and its application to transportation, dynamic programming in decision problems, and the general application of operations research techniques to transportation planning and systems operation.

MICHAEL E. CHARLES: B.Sc.(London), Ph.D.(Alta.)

Associate Professor, Department of Chemical Engineering and Applied Chemistry.

Professional experience and interests: the development of solid-liquid and gas-liquid pipeline systems, with specific applications to the transport of minerals and liquified natural gas.

MERRITT M. DAVIS: B.Sc.(Queen's), M.Sc.(Purdue)

Associate Professor, Department of Civil Engineering

Professional experience and interests: structural design of roadways, roadway materials, geometric design, road safety and accident analysis.

ALAN R. DOBELL: B.A.(U.B.C.), M.A.(U.B.C.), Ph.D.(M.I.T.)

Professor of Economics, Department of Political Economy

Research Associate, Institute for the Quantitative Analysis of Social and Economic Policy

Professional experience and interests: Professor Dobell's recent research activities include work in theoretical problems of economic growth, optimal control and investment. Mathematical analysis of these and other problems is emphasized.

BERNARD ETKIN: B.A.Sc.(Toronto), M.A.Sc.(Toronto)

Chairman, Division of Engineering Science

Professor, Institute for Aerospace Studies

Professional experience and interests: aerodynamics of aircraft performance, stability and control, the effects of turbulence on aircraft and propellers, and the dynamics of drifting and blown snow.

GERALD HODGE: B.A.(U.B.C.), M.C.P.(Berkeley), Ph.D.(M.I.T.)

Associate Professor, Department of Urban and Regional Planning

Professional experience and interests: regional economic development, the urban field and the structure of urban development, programming techniques in regional planning.

F.C. HOOPER: B.A.Sc.(Toronto), D.I.C.(London)

Professor, Department of Mechanical Engineering

Professional experience and interests: heat engineering, heat transfer in boiling and flashing liquids and in conduction in thermal insulation and related problems.

THOMAS A. LAMBE: B.A.Sc.(U.B.C.), M.Sc.(Stanford), Ph.D.(Stanford)

Associate Professor, Department of Industrial Engineering

Professional experience and interests: automobile parking policy in the central business district, the development of modal split models of individual choice.

ROSS D. MACKINNON: B.A. (U.B.C.), M.S.(Northwestern), Ph.D.(Northwestern)

Assistant Professor, Department of Geography

Research Associate, Centre for Urban and Community Studies

Professional experience and interests: dynamic optimal transportation network models, spatial consequences of transportation investments, descriptive models of the dynamics of network structure, transportation investment, and accessibility patterns, and models for the optimal location, utilization and integration of a system of airports.

WILLIAM M. MICHELSON: A.B.(Princeton), Ph.D.(Harvard)

Associate Professor, Department of Sociology

Professional experience and interests: determinants of residential location decisions, the role of urban sociology as an aid to urban physical development.

JACQUES D. PARIS: Dip.Ing.(Lille), M.Sc.(Pl.)

Lecturer, Department of Urban and Regional Planning

Professional experience and interests: methodology for solving design problems, regional economic development, urban data systems.

MORTON J.M. POSNER: B.A.Sc.(Toronto), Ph.D.(Toronto)

Assistant Professor, Department of Industrial Engineering

Professional experience and interests: queueing theory as applied to problems in transportation and computer time sharing.

LLOYD D. REID: B.A.Sc.(Toronto), M.A.Sc.(Toronto), Ph.D.(Toronto)

Assistant Professor, Department of Aerospace Studies

Professional experience and interests: flight transportation in Canada, human control of aircraft, operational aspects of aircraft, and methods of air traffic control.

RONALD G. RICE: B.A.Sc.(Toronto), S.M.(M.I.T.), Dip.T. & R.Pl.(Toronto)

Lecturer, Department of Civil Engineering

Professional experience and interests: land-use and transportation simulation techniques, transportation systems evaluation methodology, and performance characteristics and capabilities of new transport technology.

ALLEN J. SCOTT: B.A.(Oxford), M.A.(Northwestern), Ph.D.(Northwestern)

Associate Professor, Department of Geography

Professional experience and interests: methods of combinatorial optimization and their application to basic planning and design problems, models for the optimal location, utilization and integration of a system of airports, and location analysis.

PAUL S. SHEN: B.Sc.(London), M.Sc.(Birmingham), Ph.D.(London)

Assistant Professor, Department of Mechanical Engineering

Professional experience and interests: cryogenic engineering, steady and unsteady two-phase flow of cryogenic fluid in a pipeline with applications to the transportation of liquified natural gas through a long pipeline, and of electrical power through a refrigerated low resistance cable.

JAMES W. SIMMONS: B.Sc.(Western), M.A.(Chicago), Ph.D.(Chicago)

Associate Professor, Department of Geography

Professional experience and interests: description and evaluation of urban places in Canada - their location, economic and social roles using multivariate techniques, description and analysis of the interactions among urban places, development of a dynamic model for the urban system in Canada.

GERALD N. STEUART: B.Sc.(Sask.), M.Sc.(Berkeley), Ph.D.(Berkeley)

Assistant Professor, Department of Civil Engineering

Professional experience and interests: air transportation design and analysis, urban transportation planning, theory of traffic flow.

PHILLIP A. SULLIVAN: B.E.(N.S.W.), M.E.(N.S.W.), Ph.D.(London)

Assistant Professor, Department of Aerospace Studies

Professional experience and interests: the investigation and development of air cushion vehicle (ACV) technology and landware for Canadian use, and the transportation systems aspects of ACV's.

JAMES G.C. TEMPLETON: B.A. (Toronto), A.M.(Princeton), Ph.D.(Princeton)

Associate Professor, Department of Industrial Engineering

Professional experience and interests: statistical models in economic planning, and bulk-arrival and bulk-service queueing models.

A.KEITH F. TURNER: B.Sc.(Queen's), M.A.(Columbia), Ph.D.(Purdue)

Assistant Professor, Department of Civil Engineering

Professional experience and interests: urban geology, resource conservation, the location and design of regional transportation systems, engineering applications of aerial reconnaissance - remote sensing techniques, and computer applications.

LEONARD WAVERMAN: B. Com.(Toronto), Ph.D.(M.I.T.)

Assistant Professor, Department of Political Economy

Research Associate, Institute for the Quantitative Analysis of Social
and Economic Policy

Professional experience and interests: the application of linear
programming to determine optimal flow paths, the application of mixed
integer-iterative programming to determine optimal flow and investment
paths over time, estimation of generalized econometric demand function,
and cost - benefit analysis of alternative transportation policies.

JOHN W.L. WINDER: B. Comm.(Toronto), M.A. (Toronto), Ph.D.(Chicago)

Associate Professor, Department of Political Economy

Research Associate, Institute for the Quantitative Analysis of Social
and Economic Policy

Professional experience and interests: Professor Winder has undertaken
research on structural unemployment, inflation, monetary policy and its
impact on the Canadian economy, with particular reference to the agricul-
tural and industrial sectors.

2.3 York University Academic Strength

A number of faculties at York University now are well qualified for advanced teaching and research in transport and related fields. Given continued rapid growth and public support of York University, further appointments of distinction will undoubtedly be made in this area.

Details of the qualifications and interests of present York University faculty with transport orientation are provided in Appendix II.

Extracts are given below:

GERALD A.P. CARROTHERS; B.Arch, M.Arch. (University of Manitoba),
M.C.P. (Harvard), Ph.D. (M.I.T.)

Dean, Faculty of Environmental Studies, York University

Extensive experience in environmental studies including: Member, Advisory Group, Central Mortgage and Housing Corporation; Director, Institute for Environmental Studies, and Chairman, Department of City and Regional Planning, University of Pennsylvania. Numerous publications in the field of urban and regional planning.

Dean Carrothers feels that transport programmes relate particularly closely to the functions of his new Faculty of Environmental Studies. Transport will be looked at in courses, thesis and research work, both as a phenomenon in its own right, and as an important aspect of urban and regional systems. Of particular interest is the role of transport in location decisions, in socio-technological development, and in internal and external urban-regional interactions. Dean Carrothers is confident that members of his faculty will in future years generate and carry out

significant research projects in the transport sphere. The Faculty of Environmental Studies will in its graduate courses examine transport in relation to urban and regional planning, as well as the characteristics, coordination and integration of transport modes and entire transport systems. As the Faculty expands, transport planning will be offered as an area of concentration.

JAMES CUTT; M.A. (Edinburgh), M.A., Ph.D. (Toronto)

Associate Professor, Department of Economics

Professor Cutt teaches, writes and advises in the fields of public sector planning, public finance and economic development. His publications include Taxation and Economic Development, and Readings in Canadian Public Finance. He is currently working on the field of government resource allocation, employing programme budgeting and other techniques. He is interested in devoting future research efforts to transport, since he feels that major long-run economies can be obtained in this sphere.

J. TAIT DAVIS; B.A. (Toronto), M.A. (George Washington)

Associate Professor, Department of Geography and Division of Social Science

Professor Davis is strongly interested in the role of transport in economic development and has written widely in this field. His book An Introduction to Transportation will be published by Allyn and Bacon in 1970.

Professor Davis is currently analyzing commuter movements, labour sheds and money flows in a three-county area in the Niagara Peninsula. After completion of his first research phase early in 1970, he intends to expand

the study to include the interdependence patterns of manufacturing in the study area as well. The configuration and quality of transport routes play a large part in this work. His proposals for the second research phase, entitled "Commodity Flows Through Manufacturing Establishments of Southern Ontario", are already well formulated (see Appendix V). Principles learned from these studies may be applied to the planning of new towns, regions and transport systems.

On the teaching side, he is keen to explore the possibilities for a graduate course emphasizing transport demand studies and transport systems planning, which would draw on concepts of economic geography, economic theory and quantitative analysis.

JOHN G. DAY; A.B. (Oberlin College), LL.B. (Western Reserve University),

Member of the Bars of Ohio and the District of Columbia
Associate Professor, Osgoode Hall Law School. Formerly Special Counsel,
Department of Transportation, Washington, D.C. Prior experience as
consultant and legal adviser, Department of Transportation, Federal Power
Commission, Federal Maritime Administration and law practice in Cleveland.

Professor Day's publications include "Air and Maritime Contracts", in:
Williston on Contracts. Among his current projects are articles on the
laws governing industrial injuries in the transport field. He is also
investigating the impact on transport policy of the "one man, one vote"
system, especially as regards the enhanced power it gives to cities in
relation to area. Professor Day advises the U.S. Department of Transport,

Washington, D.C., on auto insurance and on accident compensation. Within the framework of a well-advanced research proposal (see Appendix V), which complements a project by Professor Feltham, he intends to analyze problems of cargo loss and liability in Canada.

Given support, Professor Day would like to carry out studies in the area of Section 35 (k) of the National Transportation Act, which provides for "uniform bills of lading and other documentation". Comparative analyses of provincial laws on the subject, and of bills of lading used by the various transport modes would be undertaken. Professor Day further plans to collaborate with experts in computer science, quantitative and systems analysis to evaluate transport needs and studies. An immediate area of concentration might be highway needs studies and regional transport requirement analyses.

IVAN R. FELTHAM; B.A., LL.B. (University of British Columbia), B.C.L.

(Oxford University). Member of the Bars of Ontario and British Columbia.

Professor and Director of the Business Law Programme, Osgoode Hall Law School of York University; Chairman of the Council, York University Transport Centre.

His experience includes teaching and research at Osgoode Hall Law School and the University of British Columbia and extensive private consulting practice including two years with a major law firm in Chicago. He teaches at Osgoode Hall Law School the important course on Transportation Law and Policy, which covers such topics as the Canadian and North American transport system; the Canadian regulatory structure including constitutional limitations on federal power; the rationale of regulation; regulatory instruments;

contractual, liability, insurance, finance and labour aspects. His course material and research interests also cover the related fields of communications and its common carriers, broadcasting and energy. Professor Feltham has developed a detailed proposal for research on Regulation of Transportation in Canada (see Appendix V), which complements and establishes the broad framework for Professor Day's freight transport project.

JAMES M. GILLIES; B.A. (University of Western Ontario), M.A. (Brown University), Ph.D. (Indiana University)

Dean of the Faculty of Administrative Studies, York University

Formerly Professor of Urban Economics in the Graduate School of Business Administration, University of California and responsible for administration of the doctoral program in business administration. Extensive experience in urban and industrial problems. Publications include several books and numerous scholarly studies.

DENNIS C. HEFFERON; B.A. (Toronto), LL.M. (Harvard), of Osgoode Hall,
Barrister-at-Law

Professor, Osgoode Hall Law School of York University

Experience includes teaching and research at Osgoode Hall Law School and consulting practice. He was a member of the Scarborough Planning Board and currently serves on the Metropolitan Toronto Planning Board.

RONALD K. HOUSE; B.A. (Mount Allison University), M.A. (Alberta),
Ph.D. (London)

Assistant Professor, Department of Economics

Professor House's field of specialization is micro-economic theory. He was a member of the Expert Technical Committee to Review Order #123994 of the Board of Transport Commissioners for Canada.

His current research interest include cost functions in the Canadian trucking industry as well as sub-optimization problems in economic theory. He suggests as future projects research on the value of capital and the cost of money, with emphasis on the transport sector.

WILLIAM A. JORDON; B.S. (Antioch), M.S. (Columbia), Ph.D. (U.C.L.A.)

Associate Professor and Coordinator of the Economics Programmes in the Faculty of Administrative Studies

Has spent much of his professional life in transport economics, with particular emphasis on airline regulation and operations. He has held research and administrative positions with four airlines, has advised cities and other public bodies on airline service, has undertaken academic research in air, land and water transport, and has taught economics and regulation at two universities. He is currently a member of the A.S.A. Advisory Committee for Statistical Research to the U.S. Civil Aeronautics Board.

His book entitled Economic Effects of Airline Regulation will be published by the Johns Hopkins Press in 1970. He has also written "Competition -- A Two-Edged Sword in Improving Air Transportation Performance?" in J. Coutinko, ed.

Transportation: A Service, 1967. His current research topic is "The Impact of C.A.B. Regulation on Military Procurement of Commercial Airlift".

Professor Jordan teaches a graduate course entitled "Economic Effects of Government Regulations", which incorporates a strong transport component.

TILLO E. KUHN; B.Sc. (Economics) (London), Ph.D. (McGill)

Professor, Department of Economics and Faculty of Administrative Studies, Director, York University Transport Centre.

Professor Kuhn has been on the faculty of the University of California, Berkeley, and its Institute of Transportation and Traffic Engineering and was a Visting Professor at the Centre of Planning and Economic Research, Athens, Greece. He is the author of Public Enterprize Economics and Transport Problems and numerous articles on transport topics. He had held a number of senior advisory appointments in transport economics and development planning.

Professor Kuhn's current research interest include the role of transport in development; PPBS and systems simulations as applied to transport networks; and the methodology and measurement of social indicators, with special reference to urban planning and transportation.

NEIL M. MCARTHUR; B.A. M.A. (Western Ontario), Ph.D. (Michigan)

Associate Professor of Geography, Atkinson College

Professor McArthur has lectured and published widely on problems of land use, airports and the air cargo industry. He recently completed a study of

the Chatham - Kent County Airport and, from the insights gained, has developed a research proposal on "A Second-Tier Airport System for the Province of Ontario" (See Appendix V). He is also defining a project entitled "Feasibility Study of the Proposal to Develop Gander, Newfoundland, as a Major Air Cargo Staging Point". He visualizes good research possibilities in the air cargo field in general, particularly the separation of air cargo routes and flights from the traditional passenger orientation of airlines. He is presently investigating possibilities for an undergraduate course in transport geography.

GRAEME H. MCKECHNIE; B.Comm. (Toronto), M.Sc., Ph.D. (Wisconsin)

Assistant Professor, Department of Economics and Faculty of Administrative Studies, Chairman of the Department of Economics.

Teaches and researches in labour economics, manpower resources and labour relations, with some emphasis on the transport sector of the economy. He is currently updating his study on "Labour Relations in the Canadian Trucking Industry", with a view to publishing it as a monograph sometime in the future. He also contributed to the study on "Manpower Requirements in the Canadian Transport Industry", sponsored by the York University Transport Centre.

ALEXANDER L. MURRAY; B.A. (McMaster), M.A. (London), Ph.D. (Pennsylvania)

Associate Professor of History

Has taught, researched and published extensively in urban history and planning. Current courses include "The Development of the Modern City" and "History of Environmental Design". He has held advisory positions and has been active as a discussant of contemporary urban problems in Canada, including housing.

ANDREAS G. PAPANDREOU; M.A., Ph.D. (Harvard)

Professor of Economics and Director of the newly established Graduate Programme in Economics.

Professor Papandreou is a scholar of international stature, who has taught at universities in North America and Europe, has published widely in economic theory, planning, development and industrial organization, and has served as Member of the Greek Parliament and as Minister of Coordination in the Government of Greece.

Professor Papandreou outlines the following research areas within transport planning and economics as potentially most fruitful:

- a) Analyses of public and private ownership, financing and control in the transport sector.
- b) Theory and practice of pricing in transportation.
- c) General investment processes and criteria, planning and project evaluation in transportation.
- d) The relationship between transport and the location of socio-economic activity.
- e) The role of transport in development and development planning: local, regional, national and international.
- f) Economic decisions in the individual transport firm.

These areas can receive emphasis in teaching and research as the new Graduate Programme in Economics grows.

GORDON C. SHAW; B.A. (Queen's University), S.M. (M.I.T.), Ph.D. (Toronto)
Associate Professor, Faculty of Administrative Studies

Professor Shaw is a mathematics and operations research specialist who has had seven years of experience with Canadian Pacific Railway Company. His Ph.D. Thesis for the University of Toronto (1968) dealt with the topic Contributions to Transportation Scheduling. He will deliver a paper entitled "The Concept of a Best Schedule" at the 36th National Meeting of the Operations Research Society of America to be held in Miami in November, 1969.

Professor Shaw currently teaches a graduate course in quantitative methods which incorporates several transport problems and cases. He would like to develop a special course on methods and cases in transport planning. On the research side, Professor Shaw is keen to analyze methods of optimally scheduling public passenger transport services.

KONRAD W. STUDNICKI-GIZBERT; B.Sc., M.Sc. (Economics) (London),
Ph.D. (McGill)

Associate Professor, Department of Economics

Professor Studnicki-Gizbert has held a number of government research and senior consulting appointments. He was Chief of the Economics Division, Air Transport Board, Government of Canada.

He is the author of Canadian Frontier Aviation, The Regional Carriers' Problem and a number of articles and reports. He recently completed major transport studies in Turkey and Bolivia. His current research interests include urban transport problems, the economics of user charges in transport, and a review and consolidation of the literature on transport economics.

ROY I. WOLFE; B.A. (McMaster), M.A., Ph.D. (Toronto)

Professor, Department of Geography

Professor Wolfe has researched and published widely in the fields of transportation, highway planning, recreational travel and traffic flow, including the book Transportation and Politics, Princeton: Van Nostrand, 1963. Several of his works have been translated into Spanish, French and Japanese.

Until 1967 he worked as Geographic Research Advisor for the Ontario Department of Highways, where he dealt with many urgent regional and urban planning problems. Professor Wolfe has been appointed Delegate to the 1970 Meetings of the Commission of the International Geographical Union in Paris. He expects to be organizing the sessions on transportation of the International Geographical Union's Quadrennial Meetings in Montreal.

Professor Wolfe teaches at present graduate courses in transportation geography, urban geography, and economic geography with transport orientation.

2.4 Conclusion

The capabilities and interests of the academic staff members in transport research at the University of Toronto and York University are extremely complementary, thereby giving strong justification for a cooperative research and teaching programme. This type of expertise in transport studies is an essential prerequisite for the analysis and solution of transport problems, since the scope of these problems can seldom be contained within the confines of any single discipline.

In Canada there presently exists only a limited number of capable personnel in the field of transportation. This fact gives further impetus to the establishment of a cooperative research programme at the two universities. Whether the research and teaching undertaken demands a knowledge of certain basic disciplines or the application of specific transport analytical techniques, both will be available from the joint University of Toronto/York University transport group.

3. TEACHING PROGRAMMES

3.1 Advantages of Combined Programmes

Joint graduate programmes by the University of Toronto and York University are obviously beneficial for both faculty and students. Such inter-university elective programmes are now possible, and we are prepared to develop joint teaching programmes in transportation. For example, urban transport planners would benefit from the Osgoode Hall Law School course on contemporary urban issues, the urban geography courses at the University of Toronto and York University, transportation planning and traffic engineering options within the Department of Civil Engineering at the University of Toronto, and graduate transport economics, public sector planning and management science courses at York University. A well structured programme along such lines should provide fundamental knowledge of general socio-economic phenomena as they are related to transport together with the specialization which is so necessary today.

Among the advantages of combined University of Toronto/York University programmes are:

- (i) A greatly expanded selection of course offerings to suit the individual requirements of graduate students can be achieved.
- (ii) Library and other teaching support services can be looked at in toto, rather than as separate units.
- (iii) Colloquia, seminars and lectures can be arranged co-operatively under appropriate terms of reference, thereby enhancing inter-disciplinary communication.
- (iv) Liaison with other universities, research agencies and government organizations active in the transport field, both nationally and internationally, can be facilitated and increased.

3.2 University of Toronto Transport Programmes

The University of Toronto offers a number of courses in transport and related fields and these are listed below by department. A more detailed course description is contained in Appendix III.

3.2.1. Graduate Courses Directly Related to Transportation

Department of Aerospace Studies

- 2006x Dynamics of Atmospheric Flight - Stability and Control
- 2007x Dynamics of Atmospheric Flight - Performance
- 2009x Navigation Guidance and Control of Aerospace Vehicles
- 2020x Flight Transportation
- 2021x Seminar in Flight Transportation
- 2025 Air Cushion Vehicle Transportation Systems
- 3001 Human Control of Flight Systems

Department of Civil Engineering

- 1030 Highway Traffic and Geometric Design
- 1032x Traffic Engineering
- 1033x Advanced Traffic Engineering
- 1034x Transportation Planning
- 1035x Transportation and Land Use
- 1036x Transportation Systems Analysis

Department of Geography

- 1603x Transportation Systems
- 1607 Combinatorial Processes, Geographic Space & Planning
- 2603 Advanced Seminar in Transportation Geography

Department of Industrial Engineering

- 1160 Mathematical Models in Traffic & Transportation Science
- 1161 Digital Simulation Techniques in Transportation Science

Department of Political Economy

- 2902 Economics of Public Utilities

Department of Urban and Regional Planning

- 1013x Transportation
- 1015x Regional Science Methods for Planning

3.2.2 Graduate Courses with Content of Value to Transport Specialists

Department of Civil Engineering

- 1024 Special Applications of Airphoto Interpretation

Department of Geography

1502x Urban Systems
1907x Mathematical Models of Spatial Processes

Department of Industrial Engineering

1100 Dynamic Programming
1120x Reliability
1130 Industrial Applications of Stochastic Models
1140 Statistical Decision Theory
1150 Production Problems in the Natural Resource Industries

Department of Political Economy

2602x Resource Allocation in the Public Sector
2701x Project Evaluation and Financing in Development
Courses in Econometrics

Department of Urban and Regional Planning

1019x Seminar in Regional Development Planning
1030x Innovative Planning: Principles and Approaches
1035x Urban Data Systems and Analysis
1038x Strategies and Techniques of Programming

3.3 York University Transport Programmes

Various faculties and departments at York University offer graduate courses and programmes with transport orientation or of interest to the transport specialist.

The detailed course descriptions are given on Appendix IV, Graduate Courses in the Faculty of Environmental Studies are at the time of writing going through the formal York University approval processes.

3.3.1 Graduate Courses Directly Related to Transportation

Faculty of Administrative Studies

628.3 Economic Effects of Government Regulation

Faculty of Environmental Studies

717. Traffic and Transportation

656. Environmental Systems Analysis

Department of Economics

542 Transport Economics

Department of Geography

531 Transportation Geography

533 Recreation Geography

534 Locational Analysis in Rural Geography

550 Urban Geography: Concepts and Methods

551 Locational Analysis in Urban Geography

Osgoode Hall Law School

267.3 Contemporary Urban Issues

278.3 Regional Transportation Problems

239.3 Transportation Law and Policy

3.3.2 Graduate Courses with Content of Value to Transport Specialists

Faculty of Administrative Studies

530. Quantitative Methods for Management

530.L Laboratory in Computation

650. Policy Planning and Implementation

602. Public Sector Management and the Canadian Political System

655. Public Policy Planning and Implementation

620. Advanced Managerial Economics

633.3 Management Science I

634.3 Management Science II

681.3 Urban Economics

662.3 Marketing Research

- 686.3 Systems Planning in the Public Sphere: Basic Principles and Techniques
- 687.3 Systems Planning in the Public Sphere: Advanced Topics in Methodology and Applications
- 659.3 Advanced Seminar on International Planning and Development

Faculty of Environmental Studies

- 501. Introduction to Environmental Studies
- 502:3 Workshop in Environmental Studies
- 511. Introduction to Environmental Professions
- 591.,691. Field Employment
- 592.,692 Field Research Experience
- 611.,621.,631. Workshops in Environmental Professions
- 622. Environmental Planning and Design Processes
- 624. Environmental Management Processes
- 625. Societal Organization
- 626. Legal Processes in Environmental Professions
- 627. Communication in Environmental Professions
- 634. Social Behaviour in the Environment
- 636. Analytical Methods in Environmental Professions
- 641.,651.,661. Workshops in Environmental Sciences
- 642.,652. Quantitative Methods in Environmental Studies
- 654. Research Methods in Human and Physical Environments
- 662. Theories and Principles of Scientific Method
- 663. Theory of Physical and Human Environments
- 664.,665. Scientific Method in Environmental Planning and Design
- 500. Independent Study and Research
- 600. M.F.S. Thesis Research
- 711. History of the City
- 712. History of Environmental Design
- 713. Environmental Perception
- 714. The Urban Environment as a Bio-System
- 715. History of City Planning
- 716. Housing
- 718. Regional Analysis
- 719. Sociology and Economics of Housing
- 720. Social Planning
- 721. Government and the Environment
- 722. The Marketing Process and the Urban Environment
- 723. Administration and Management of the Environment
- 724. Art and the Environment
- 725. Economic Systems "Life Styles" and the Environment

Department of Economics

- 524. Research Methods in Economics I
- 525. Research Methods in Economics II
- 530. Public Finance I
- 531. Public Finance II
- 533A. Systems Planning in the Public Sphere - Basic Principles and Techniques

- 533B. Systems Planning in the Public Sphere - Advanced Topics in
Methodology and Applications
- 540. Public Regulation of Economic Activity
- 544. Energy Economics
- 570. The Economics of Development I
- 571. The Economics of Development II

Department of Geography

- 501. Theory of Geography: Concepts and Methods
- 510. Historical Geography: Concepts and Methods
- 511. Geography of Canada since the 17th Century
- 512. Canada its Geographical Exploration Investigation and
Interpretation
- 530. Economic Geography: Concepts and Methods

Osgoode Hall Law School

- 270.3 Housing and Urban Renewal
- 230.3 Investment Industry and Corporate Control
- 232.3 Land Use Planning
- 276.3 Methods of Empirical Research
- 277.3 Metropolitan Problems
- 279.3 Regulation of the Economy
- 240.3 Urban Legal Studies

Department of Political Science

- 541. The Canadian Political Process
- 542. Canadian Political Behaviour and Public Policy
- 505. Methodology of Political Science

Department of Sociology

- 504. Problems in Research Design and Quantitative Methods
- 604. Problems in Research Design and Quantitative Methods
- 622. Problems in Formal Organization
- 626.2 Urban Communities

4. RESEARCH PROGRAMMES

4.1 Introduction

Research above all requires well-trained, strongly motivated and potentially creative people. The combined academic strength of the University of Toronto and York University, as described in Section 2 and Appendices I and II of this proposal, represents a significant research resource. Our two universities feel confident that this "talent pool", concentrated in one of Canada's major metropolitan areas, can successfully tackle a wide variety of advanced and challenging transport research tasks.

However, modern society generates ever increasing demands for research talent and research results. Exceptional opportunities for transport scholars are developing everywhere, in Canada and internationally, in the public as well as in the private spheres.

Sustained and imaginative public support will therefore be required if worthwhile results are to be achieved for the Canada of tomorrow. It is sincerely hoped that the Canadian Transport Commission will give much needed leadership in the neglected field of transport research and harness some of the research talent which would otherwise go elsewhere.

On the following pages our two universities have put forward some first research ideas for the consideration of the Canadian Transport Commission. They can serve as a working base for future discussions and for the preparation of specific research proposals and detailed operating plans.

When reading through these preliminary research suggestions it should be borne in mind that they reflect on-going operations at our two universities and a great variety of circumstances. Some of the projects shown are already under way. Others are well-formulated and could be pushed ahead

speedily. The University of Toronto proposal for transport systems studies in the Ontario-Quebec corridor, as well as several projects submitted by York University, belong in this category. Yet other research suggestions are in the conceptual or "rough idea" stage, but could nevertheless be advanced without difficulties if support is forthcoming. Some projects can be carried out by a single scholar with research assistance and are therefore mentioned in Section 2 as representing the individual's current interests. By contrast others will require high-powered, well-organized teams and assured financial support for several years. We imagine that many of the Canadian Transport Commission's research needs call for the team approach.

At this early stage it has not been possible to any great extent to show how joint University of Toronto - York University research teams might be constituted. However, many of the research projects would foster such a cooperative approach. This is especially true of the University of Toronto Ontario-Quebec corridor proposal, which lends itself extremely well to a combined interdisciplinary research effort. York University has a very definite interest in the identification and analysis of the main factors in the planning, design, analysis, implementation, operation and management of total transport systems for social and economic development. For the purpose of this proposal then, the interests and capabilities in transport systems analysis of both universities can be assumed to be represented by the research proposal of Section 4.2.1.

In general, our two universities are enthusiastic to join forces in advanced, productive transport research. Given our ample academic manpower resources and solid research support, as shown in Section 5, we foresee no obstacles from our point of view. Joint transport research programmes have been operated successfully for years by other universities, for instance by Harvard and M.I.T. One can benefit from their

experiences.

We feel that the practical details of future combined University of Toronto - York University research programmes should best be worked out on the basis of specific research assignments for which definite public interest and adequate funding exists. We are ready to enter into discussions on such projects with the Canadian Transport Commission at any time.

4.2 University of Toronto Research Programme Proposal

4.2.1 Transportation System Analysis and Evaluation in the Ontario-Quebec Corridor

(a) Introduction

For 150 years the St. Lawrence-Great Lakes Corridor has been the most important regional component in the economy of Canada. This easily-traversable, readily-habitable axis was a key salient for opening up the northern half of the Continent. By 1825, it already boasted an elaborate road network serving its extensive agricultural economy and the emerging urban-industrial matrix of post-Confederation days was amply aided by considerable railroad mileage linking it both to West and East. Since almost its beginning, this 800-mile, Quebec City-to-Windsor axis has featured a nearly continuous belt of agricultural settlement studded with urban service and industrial centers. Today, it contains the two largest cities in the country, several other metropolitan areas, as well as a still prosperous agricultural sector.

Upwards of one-third of Canada's population today lives in the Corridor. Its manufacturing industries account for nearly 60 percent of the value added in manufacturing in the nation. Nearly half of the country's universities and colleges are here, as are most of its financial and communications industries. This persistent concentration is readily explained by the Corridor's high access to raw materials, to consumer markets, to specialized labour markets, to specialized services, to centres of political power, to sources of capital, to modern technology, and to external information.

The accessibility of the Corridor is not due simply to its physical location -- other eastern Canadian regions such as the Ottawa

Valley, the Eastern Townships, or the Maritime Provinces have had as good or better location. The St. Lawrence-Great Lakes Corridor also possesses desirable internal characteristics in its topography, settlement pattern, urban system, and transportation. These characteristics permit it to exploit innovation over its full length. The spread of technical, material, and organizational innovations (including innovations in transportation), a vital condition for continued growth and development, is conditioned by the routes and quality of the transportation available. The Corridor is, of course, uniquely able in this regard.

The success of the Corridor internally has always been dependent upon its access to other metropolitan regions. Initially, and for most of its history, these links have been overseas. In the future however, its orientations predominantly will be to other North American Corridors. Links are already evident to the U.S. Great Lakes Corridor and the Northeast Corridor, almost as if it were a "hinge" between them. This extensive integration of the North American space economy cannot but have profound effects on the future of the St. Lawrence-Great Lakes Corridor. Not the least of the effects could be the development of an inter-regional high-speed land transportation system along the corridors.

As the St. Lawrence-Great Lakes Corridor rounds out its second century, its critical role in the development of the nation will, if anything, be enhanced. Its vitality must be maintained; its ability to nurture and spread innovation in its own region and to others must be maintained. This latter trait has been a function of, as much as anything, the high degree of total accessibility of the Corridor provided by the routes and quality of its transportation system. In no way should this

system be left to languish for the future. The benefits of increasingly rapid social and technical innovation in the world may, otherwise, be denied the Corridor and the nation.

(b) Statement of Objectives

In undertaking the task of planning for the future development of the Ontario-Quebec corridor full regard must be had for the broad implications which such a study assumes. The general objectives of a comprehensive transportation study might be postulated as follows:

- (i) to evaluate the adequacy of existing and planned transportation systems for both freight and passenger movements in the corridor and to recommend immediate short-term adjustments in existing policies and plans,
- (ii) to evaluate the necessity and implications of travel mode coordination in the corridor and to develop a comprehensive long-range transportation plan,
- (iii) to evaluate the regional development implications of alternative transportation development expenditures and policies,
- (iv) to develop and improve transportation demand forecasting capabilities, and
- (v) to develop and evaluate the characteristics and capabilities of new transportation technologies.

A more specific statement of objectives can only be made after a more detailed analysis of existing problems and the structuring of the study into a number of component parts. Since this detailed statement of objectives is critical for the subsequent development of the study further

problem definition is a necessary initial step in the analysis procedure.

(c) A Matrix Structure for the Problem

While the analysis of existing data is a common procedure for defining a problem area there is an alternative approach which may often result in not only a more comprehensive understanding of the problem but also may point out new possibilities for solutions. This approach involves the derivation of a conceptual framework into which the various components of the problem may be fitted. This type of structuring is accomplished by an abstraction of the problem area in accordance with its basic dimensions. The advantage of such a structure is that it permits certain distinctions and relationships which may assist in both further problem definition and the generation of alternate solutions. It is also of value in distinguishing interrelationships between component problem areas and thereby has potential as a basis for rational decision-making.

In reference to the transportation corridor study the problem may be stated in terms of its two basic determinants - transportation demand and transportation supply. Since the interaction of demand and supply may be considered at different levels of detail, scale may also be said to be a dimension of the study. The use of these three basic measures of demand, supply and scale for the structuring of the problem is shown in Figure 1.

It is the disparity between the corridor travel demand characteristics and the travel mode characteristics which defines the problem areas, with variations expected in accordance with the scale of the study. Referring to the demand-supply matrix it can be seen that the rows demonstrate the extent of intermodal competition for any particular

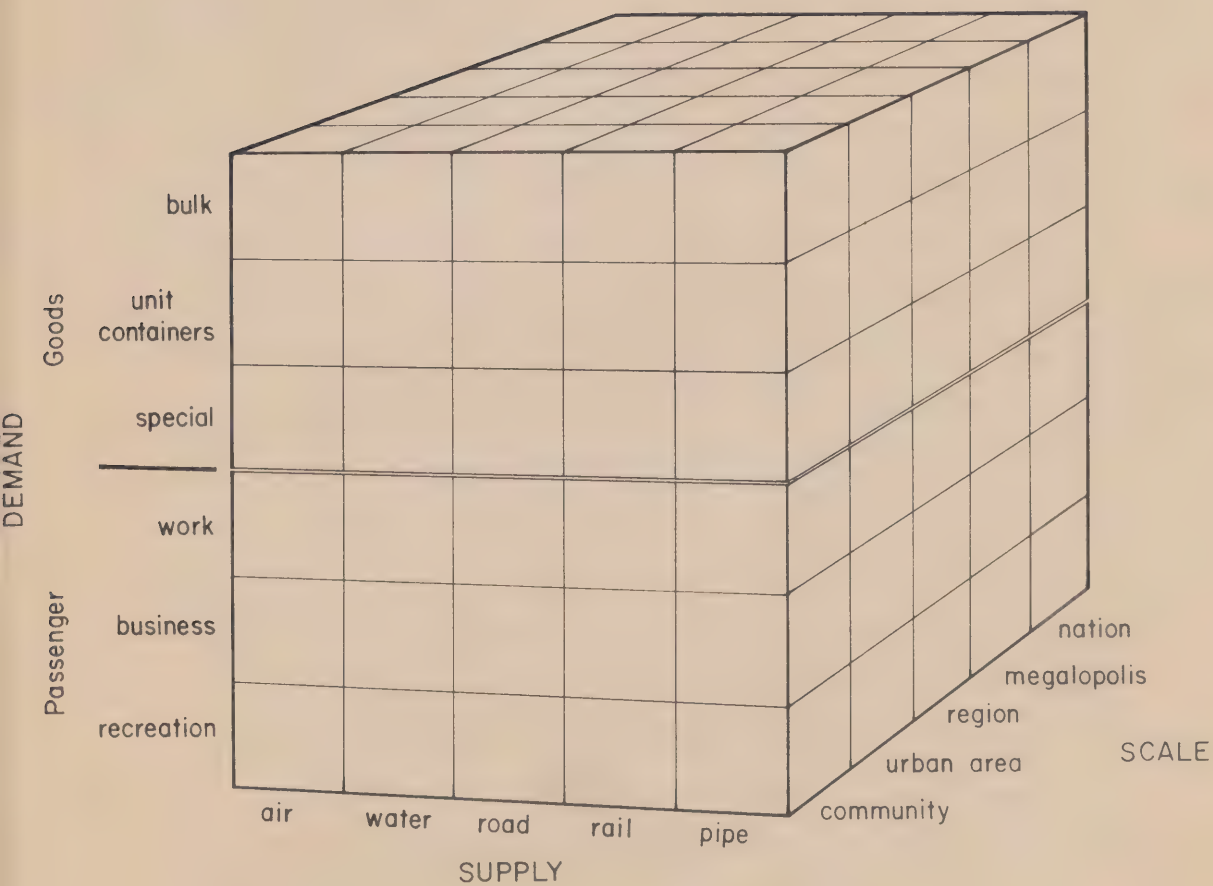


Figure 1.

segment of demand and the columns the flexibility of a particular mode in accomodating many types of demand. Obviously many of the cells will have little meaning. Other cells may have meaning but lack examples in existing situations.

The subdivisions of demand and supply into the components shown in the diagram are for representation purposes only, since demand and supply should each be segmented by their characteristics rather than by type. (See table 1) Therefore, while individual modes of transport may have certain distinctive characteristics (such as high capacity or low speed) which set them apart from other modes, they may have other qualities which are common to several types of transport, thereby placing them in a competitive market for specific types of travel demand.

The structuring of the problem in the manner suggested does permit the generation of requirements for new technology in meeting specified segments of demand. For example, high speed ground transport, with its high capacity and speed might satisfy both goods and passenger movements which require low trip times and costs and take place in concentrated patterns of origins and destinations. The requirements for refining and utilizing the suggested problem matrix, then, would be the classification of demand by its specific characteristics and the determination and classification of the operating and cost characteristics of new and existing modes of travel.

Table 1

I Demand

<u>type</u>	<u>characteristics</u>
(a) Goods	
- bulk	magnitude
- unit containers	
- high-cost, semi-processed	timing
(b) Passenger	preferred trip times
- work commuter	preferred trip cost
- business	
- recreation	spatial pattern of origins and destinations

II Supply

<u>type</u>	<u>characteristics</u>
Classified in accordance with method of (i) guidance	capacity
(ii) motive power	speed
(iii) support	scheduling
	level of service
- roadway	cost
- railroad	safety
- airways	flexibility
- waterways	weather dependence
- pipeline	space requirements

III Scale

- community
 - urban area
 - region
 - metropolitan
 - nation
-

(d) Basic Analysis Framework and Suggested Component Studies

The following discussion, building upon the methodology developed by the Northeast Corridor Transportation Project as well as other contemporary transportation planning projects, outlines very briefly some of the research topics which are to be undertaken by the interdisciplinary transportation group at the University of Toronto. Taken together, these component studies constitute a comprehensive program for research on the planning of transportation systems. This framework emphasizes the fundamental interdisciplinary nature of transportation planning; it is anticipated that researchers from at least two disciplines will be involved in each component study. Moreover, as is shown in the accompanying diagram, the component studies are highly interrelated with each other. At the conclusion of this section a listing and description of some current research at the University of Toronto which is directly related to the research programme is presented.

The basic framework for transportation planning is the following:

- (a) Forecast or determine exogenous variables which have some implications for the suitability of alternative transportation plans;
- (b) From these forecasts, develop a transportation plan or set of plans which appears to be appropriate;
- (c) Identify the consequences of the plans;
- (d) Evaluate the plans in terms of community goals;
- (e) Identify and take into account the appropriate feedback relationships;
- (f) Make recommendations for development program.

One of the major problems with such a framework, of course, is that few variables are completely exogenous. Thus it is often necessary to make

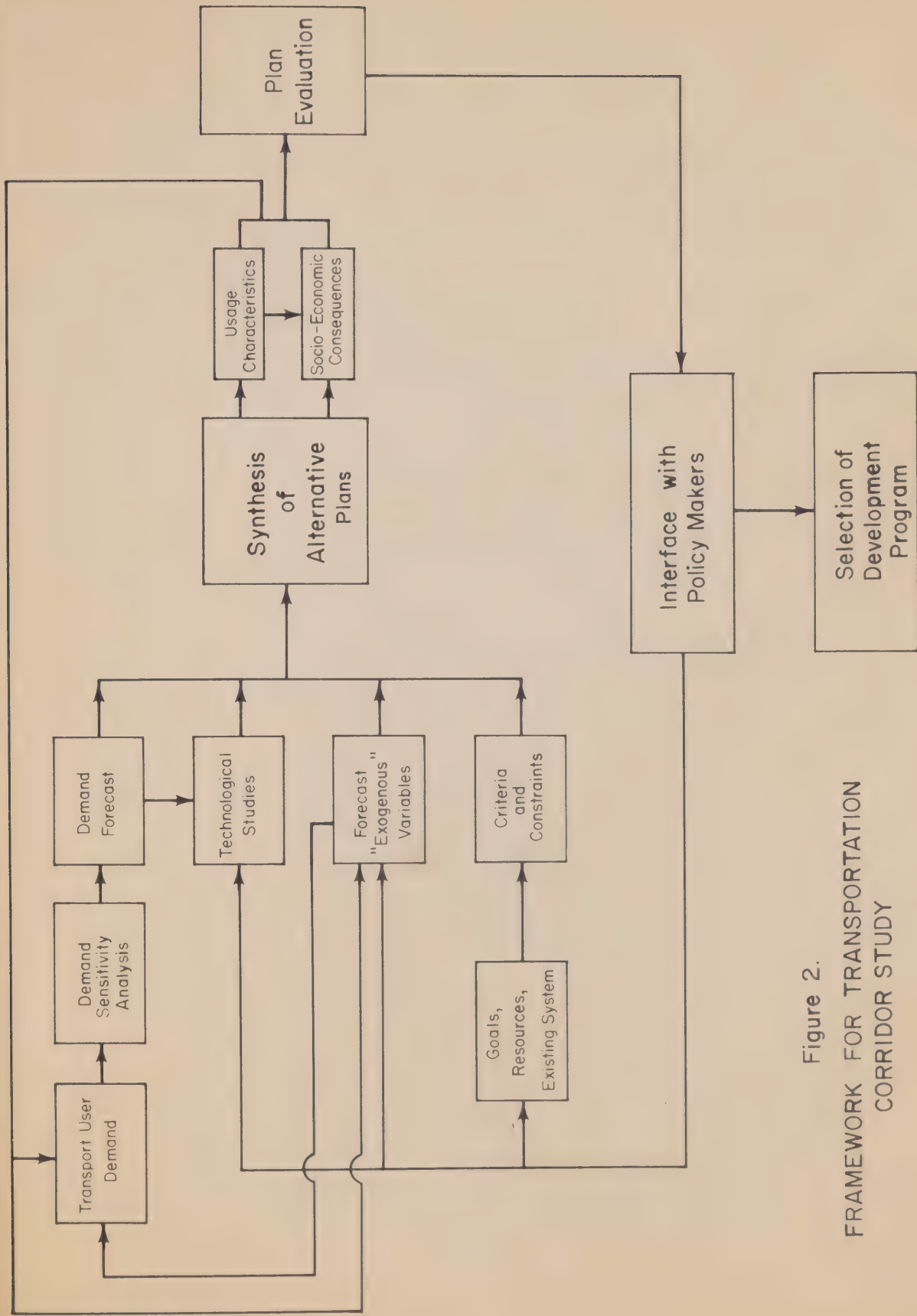


Figure 2.
FRAMEWORK FOR TRANSPORTATION
CORRIDOR STUDY

an initial assumption that they are and subsequently modify this assumption by feeding back initial results to update initial values of the variables. Four of the component studies are concerned with the forecasting of exogenous or pseudo-exogenous variables.

(i) Demand Analysis

Much interesting research has been undertaken on the demand for transportation in recent years. This project will formulate and calibrate generalized demand functions for transportation systems in the Ontario-Quebec Corridor. In addition, a time series analysis of demands will also be undertaken. For new systems with radically different performance characteristics, demonstration projects may be necessary to improve the accuracy of demand forecasts. Assistance with the preparation of such experiments could be given by the U. of T. transportation group.

(ii) Technological Studies

This component would review the system characteristics of potential future technologies as they relate to users (passengers and shippers), operators and operating agencies, and non-users. Such characteristics would include costs (capital, operating, maintenance), reliability, noise, vibration, visual appearance, etc. This study can draw heavily on the Research and Development undertaken for U.S. Northeast Corridor Project, but the Ontario-Quebec Corridor may have particular needs for which other technological systems are more appropriate.

(iii) Forecasting other "Exogenous" Variables

An important input to any planning process is the forecasting of significant independent variables. National incomes, economic activity, population, foreign trade levels, and certain policy decisions, for example, may be assumed to be independent of transportation decisions. These and other variables will be predicted using econometric modelling techniques such as the U. of T. Econometric Model of Canada and spatial forecasting approaches such as the U. of T. Urban Environment Study, as well as the more intuitive speculative approaches. Many variables have reciprocal relationships with the transportation process. It is often difficult to determine a priori which are "lead" and which are "lag" variables. For such variables it is often desirable to make an initial approximation by considering them to be exogenous. For example, the settlement pattern is predicted, and the transportation demands estimated from this forecast; the system generated to satisfy these demands in turn induces or diverts demands for movement, and even may result in a significant modifications in the settlement pattern. These complex network of feedback loops make a coordinated interdisciplinary approach mandatory.

(iv) Goals and Resources

Planning is a goal oriented activity. Thus in planning a transportation system, the goals of the community should

be identified and transformed into criteria which are sensitive to transportation planning decisions. Moreover, the resources and existing state of the system may be interpreted as constraints on the plan synthesis process. This component study is extremely important, but the difficulty of operationalizing social goals to make them relevant to transportation plans should not be underestimated.

(v) Synthesis of Alternative Plans

This component study will attempt to generate transportation plans and system configurations which are appropriate for the demands, goals and constraints of the region. This process consists of specifying network geometries and temporal sequencing of transportation capacity, route alignments, station or interchange spacing, modal interfaces, subsidy policies, pricing mechanisms, regulatory frameworks and methods of financing. Plan synthesis will be achieved by a combination of mathematical optimizing techniques as well as more informal approaches where intractable relationships are encountered. The ultimate product of this component study will be a set of simulation models which can be used for parametric analyses to determine the sensitivity of the results to goals, GNP estimates, population patterns, technologies, and demand levels.

(vi) User and Non-user Consequences of Transportation

The transportation system itself, the way it is used and the potential it imparts all combine to generate consequences some of which are internal to the transportation system

itself, many of which are of a much wider significance. The choice of transportation system policies may have important implications for many economic growth indicators such as income, trading patterns, tax levels, settlement patterns, land values, the differential incidence of consequences on different population groups and subregions, the aesthetic appearance of an area, the environmental pollution effects, and even the physical and mental health of the population. Models which predict the magnitude and incidence of these and other consequences will be formulated as an important part of the proposed research project.

(vii) Plan Evaluation Strategies

Having generated several systems and predicted their consequences a major task remains--that of evaluating the various alternatives in terms of criteria and ultimately selecting the system which is judged to be optimal. Cost-effectiveness strategies will be employed. Trade-offs between various criteria will be identified and measured and the opportunity costs of investment in transportation will be studied. The research will ultimately result in suggestions for the development of transportation information systems with which the actual consequences of plans could be monitored and evaluated.

(viii) Interface with Policy Makers

Once alternative plans have been evaluated by the research group and trade-off relationships are identified,

it is still not always clear which if any of the alternative set of plans should be selected and developed. The information is presented to the policy makers' agency which may respond in two alternative manners: (1) Select one of the set of "evaluated" system plans or (2) modify the "initial conditions" of the planning process, that is, change the assumed goal resource structure, establish a high priority Research and Development program to invent more appropriate technological configurations, or alter some of the forecasts of the exogenous variables, in particular those directly within the jurisdiction of the policy making agency. In addition to this re-evaluation process by the policy makers, the research program must continually reclarify the needs, attitudes and constraints of the client-sponsor. Only in this way can the research program be responsive to the needs of the community which is of course our ultimate sponsor. This of course does not mean that the research program is to be dominated by the sponsor. Only intellectually interesting problems will be emphasized. In this way the university community can assume an increased social relevance in conducting mission-oriented research without compromising any of its academic excellence.

(e) Proposed Preliminary Research Programme

Before carrying out the detailed component studies discussed above, we would need to devote some further effort to studying current research in regional transportation planning and in formulating in greater detail the research problems to be investigated.

Firstly, we need to collect and review previous work done on the Ontario-Quebec Corridor by federal and provincial government departments and agencies, transportation companies and others. As we do so, we will also collect data on the Corridor, list possible sources of further data, and compile a list of planning agencies whose work is related to the Corridor area.

In addition to studies directly related to the Ontario-Quebec Corridor, we must also consider research and planning done for other regions which may be relevant or applicable to the Corridor. In particular, we propose further study of the very large body of publications of the Northeast Corridor Transportation Project. In studying this work careful attention must be given to those parts of their work which can be applied to the Ontario-Quebec Corridor, and to those parts which are inapplicable because of differences in geographical, economic, meteorological and demographic conditions. With regard to the Northeast Corridor Project, it is possible to distinguish three major areas in which significant contributions have been made. These are as follows:

- (i) the research and development of new technological systems of transportation in terms of both their cost and operating characteristics,
- (ii) the development and calibration of simulation models of transport demand and economic impact,

- (iii) the concept and development of rail and transit demonstration projects to assist in the estimation of travel demand sensitivity.

The Northeast Corridor project can also be expected to be of value in setting out the problem areas which are likely to be encountered in corridor transportation and in the determination of methods and requirements for data collection.

Further work on more detailed problem formulation must also be undertaken initially and this may be conducted in conjunction with the data and research review and the Northeast Corridor Project review discussed above. This work will lend to a more precise and detailed proposal for research on problems whose solutions are important for planning the future development of the Ontario-Quebec Corridor, and which are not adequately treated by work already done.

It is anticipated that a period of from eight to twelve months would suffice for the preparation of a more detailed proposal. It may be possible to start some of the component studies before completing the detailed proposal.

4.2.2 University of Toronto Research Capabilities and Activities in Transportation

The analysis structure which has been set out in the above research programme has been provided as a basis for designing component studies, but it also lends itself to the structuring of the research into areas of disciplinary or interdisciplinary concern. This framework, therefore, can be used to classify current research activities and capabilities at the University of Toronto and it ably demonstrates the broad spectrum of

interest in transport problems which exists at this institution.

(i) Demand Analysis

The Department of Civil Engineering is currently involved in several projects in transportation planning and engineering, all of these being under the supervision of one of five staff members in transportation and with the assistance of a graduate student body of three Ph.D. and eight Masters candidates. Presently there are four projects which pertain to demand analysis: an evaluation of alternative trip generation estimation procedures for the Metropolitan Toronto region (Rice), a comparative evaluation of trip distribution and assignment procedures (Soberman), a study of performance characteristics of two-mode transportation systems for varying urban form (Rice), and an analysis of home-to-work trips in metropolitan areas (Paris).

The Centre for Urban and Community Studies and the Departments of Geography and Urban and Regional Planning are cooperating in a study entitled "An Urban Environment Study of Ontario and Quebec". This long term interdisciplinary research programme is concerned with the identification of current structural relationships and evolutionary trends in the urbanization process of the region and the forecasting of future developments to the year 2000. Within this research project a component study on the analysis and description of the interactions among urban places in Ontario and Quebec (Simmons) is being conducted.

(ii) Technological Studies

Much of the research on the technology of transportation has been conducted by the Department of Aerospace Studies which, over the past two decades, has undertaken several projects in aeronautical engineering focussed on aerodynamics, structures, propulsion, noise and flight dynamics.

Attention more recently has been directed to the use as well as the nature of flight vehicles, so that presently programs are underway in new areas of research such as air cushion vehicle technology, air traffic control procedures and the man/machine system involved in flying aircraft and air cushion vehicles. More specifically the following research projects are currently in progress*:

- Mechanics of Rarefied Gases (Patterson, de Leeuw)
- Plasma Dynamics (de Leeuw, Measures)
- Hypervelocity Flows, Implosions and Impact (Glass)
- Space Power Generation, Advanced Propulsion and Earth Resource Satellites (Townsend)
- Aerodynamic Noise (Ribner, Chu)
- Subsonic Aerodynamics (Etkin, Ribner)
- Aerospace Flight Dynamics (Etkin, Hughes)
- Materials Science and Structures (Korbacher, Tennyson)
- Rocket Research (de Leeuw, Tennyson)
- Molecular Beams and Surface Interactions (French, Howsmon)
- High Temperature Gas Dynamics and Gas Physics (Sullivan)
- Laser Excitation Diagnostics (Measures)
- Flight Transportation (Etkin)
 - Measurement of Human Pilot Describing Functions in a Pursuit Task (Reid)
 - Study of the Remnant Portion of the Mathematical Model of Human Pilots (Gordon-Smith)
 - A Study of the Flow of Air Passengers into Toronto International Airport (McLeod)
- Industrial and Architectural Aerodynamics (Etkin)

* University of Toronto Institute of Aerospace Studies, "Annual Progress Report 1968", October 1968.

The Department of Chemical Engineering and Applied Chemistry has concentrated its research in transportation technology on the pipeline mode, with emphasis on the flow of solid-liquid and gas-liquid systems. Direct applications are both the short and long distance transport of raw materials, such as coal, sulphur, potash and iron ore and the transport of liquified natural gas. Current research projects are underway in these areas of study.

Related research is also being conducted by the Department of Mechanical Engineering, with active investigation being devoted to the transportation of natural gas in liquified form through pipelines. This problem is related to the proposal for simultaneous transmission of liquified natural gas and electrical power through refrigerated low-resistance cables. This work is supported by Hooper and Abdelmessih and a strong fluid mechanics group. Research has also been devoted to combustion, especially as it relates to detonation in internal combustion engines and to resulting air pollution. This study is under the guidance of Allan, with participation by Scott, Ward, and Scheffer.

With regard to control systems in transportation the Departments of Physics, Civil Engineering and Industrial Engineering all have some involvement. The first department has developed a computer controlled device for measuring photographs with applications to air traffic control (Prentice) and the second is currently involved in a comparative analysis of alternative computer traffic signal control systems for Metropolitan Toronto (Steuart). The Department of Industrial Engineering is engaged in the use and development of operational research methods and

their application to a wide range of transportation problems. In this regard they have conducted basic research on the processing of visual information by the human brain (Foley, Gupta, Ross), mathematical models of queues (Posner, Templeton), the reliability of repairable systems (Buzacott), applied computer science (Anderson, Cohn) and control theory (Porter, Bernholtz).

(iii) Exogenous Variables

Significant research in this area at the University of Toronto is basically confined to two special centres, the Institute for the Quantitative Analysis of Social and Economic Policy (IQASEP) and the Centre for Urban and Community Studies. IQASEP and the Department of Political Economy have devoted considerable research to the development of an econometric model of the Canadian economy. This model has been designed to forecast the major national income components through the estimation of the structural relations among these components and through the simulation of the economy's response to population growth trends. The model is now fully operational.

The Centre for Urban and Community Studies, with the Departments of Geography and Urban and Regional Planning have been involved in studies which pertain to exogenous input to transportation research in the Ontario-Quebec corridor. This involvement has come about through the Urban Environment Study which was described earlier in this section and includes the following component studies: the evolving form of urban development (Bourne), spatial interaction patterns (Simmons), spatial forecasting techniques (Curry), spatial reorganization of the rural economy (MacDougall), trends in manufacturing locations and linkages (Britton),

analysis and prediction of human spatial behaviour (Baker), studies of the urban field (Hodge), and the Delphi approach to the derivation of alternative urban futures.

This Centre has also initiated a projected five-year research project on housing environment and social mobility, in conjunction with the Department of Sociology (Michelson). This study is concerned with the housing environment as an attraction and determinant of residential location and mobility.

Yet another study which is relevant to this section is concerned with the evaluation of existing urban land use forecasting models and their applicability to transportation planning. This research is currently underway in the Department of Civil Engineering (Rice). The Department of Industrial Engineering has also done recent work concerned with automobile parking (Lambe), airline scheduling (Shaw), and railway freight rates (Abrams, Turgeon).

(iv) Goals, Existing System and Resources

In this area of study the Department of Geography and the Centre for Urban and Community Studies are participating in a transportation project as a component of the urban environment study described previously. This particular project is a study of the spatial dynamics of network structure, transportation investment and maintenance expenditures, and accessibility in Southern Ontario and Quebec (MacKinnon).

(v) Synthesis of Alternative Plans

Once again the urban environment study of the Department of Geography and the Centre for Urban and Community Studies contains a component study which is pertinent in this area as well as previous areas

of research. Work has been initiated on the generation of optimal transportation networks for Ontario and Quebec (MacKinnon). An additional project proposes to formulate models and derive computational solutions for location, utilization and integration of the Canadian airport system (Scott, MacKinnon).

The Department of Civil Engineering also has on-going research directed toward the synthesis of transportation plans, with particular reference to computer applications in the location and design of regional transportation networks (Turner).

(vi) User and Non-User Consequences of Transportation

This fifth area of research is very broad in scope and for this reason current studies at the University of Toronto cannot hope to cover the entire field, although the interests of the disciplines involved in transportation research certainly could provide a very comprehensive coverage of all aspects of system consequences.

The Institute for the Quantitative Analysis of Social and Economic Policy and the Department of Political Economy (Bossons) have derived a tax impact model which could be used to estimate the effect of alternative methods of financing transportation investment in the Ontario-Quebec corridor. This type of policy variable could be of significant importance in studying and planning for the corridor region.

The spatial consequences of alternative future transportation technologies and networks for Metropolitan Toronto is the research subject of a study by the Department of Geography and the Centre for Urban and Community Studies (MacKinnon). These two departments are also conducting a research study of the social and physical correlates

in a metroplitan area (Bourne); a study which is concerned with an examination of the interrelationships between physical structures within a metropolitan area (including transportation facilities) and the socio-economic characteristics of urban neighbourhoods.

Research of a more specialized nature is being undertaken by the Departments of Civil Engineering and Industrial Engineering. The former is involved in an intensive study of road accidents on site (Davis), with attention being given to both the engineering and non-engineering factors involved. The Department of Industrial Engineering has also published research on the analysis of accident records (Cunningham, Carter, Carr) and on the effectiveness of seatbelts (Surry).

4.3 York University Transport Research Suggestions

4.3.1. Proposals Developed in Greater Detail

These, as shown in Appendix V, include the following:

Regulation of Transportation in Canada

(Professor Ivan R. Feltham)

Comparative Analysis of the Federal and Provincial Laws Governing Cargo Loss

(Professor John Day)

These two studies in the field of transport law and policy are inter-related and complementary. The first proceeds from the legislative intent of national transportation policy to examine present-day regulation of the transport industry. The second study then analyzes the freight carriers' legal obligations to the users. This provides continuity of research ideas and analyses from public transport policy to the carriers, and from the carriers to the users. A companion study on the legal obligations of passenger carriers would follow logically later.

Research Project on Regulation of Highway Transport

(Professor Ivan R. Feltham)

This research project on highway transport, a very important and yet relatively unexplored segment of the Canadian transport system, has two immediate goals. The first will be a survey and comparative analysis of the existing law and practice, together with a discussion of current and expected problems, leading to the preparation of a major original paper on the subject. The second would be the use of the highway transport material in the teaching programmes and for the definition of future research goals in this area.

This project, like the previous two, is strongly linked with the

"Review of Fundamental Concepts in National Transport Policy and Legislation" suggested below.

Commodity Flows Through Manufacturing Establishments of Southern Ontario

(Professor J. Tait Davis)

Builds on previous socio-economic linkage research by Professor Davis and complements recreational and other people flow analyses of Professor Roy Wolfe. Of great practical significance for transport demand forecasting and systems planning. Potentially a valuable component of the University of Toronto - York University transport system and corridor studies.

A Second-Tier Airport System for the Province of Ontario

(Professor Neil M. McArthur)

Would represent a pioneer effort to determine the economic effect of these airports upon the areas they serve, or even to determine the extent of these areas. Also involves study of relationships with mainline aviation and with surface transport media.

Review and Consolidation of the Literature on Transport Economics

(Professor Studnicki-Gizbert)

Economics in general and transport economics in particular are in a period of transition. Earlier traditions beginning with Dupuit, Pigou, Taussig and leading to contemporary welfare economists active in transport, such as Hotelling, Winch, Forster and Walters, may still have much of value to contribute. But these works need to be critically reviewed, consolidated and integrated with promising new transport concepts which have partly originated in the related fields of engineering and engineering-economics, operations research and systems analysis.

Analyses of the Economic Foundations of Transport User Charges

(Professor Konrad Studnicki-Gizbert)

This companion research project goes to the heart of the perennial demands for more "rational" public or publicly regulated transport user charges. Insofar as user revenues can or should guide investment decisions, insights gained would also help to improve public resource allocation decisions.

Both of Professor Studnicki-Gizbert's projects would be most valuable by providing idea and literature review base for the suggested systems and fundamental concepts studies shown below.

A Survey of the Volumes of Inter-City Passenger Travel by Times of Day on Different Public Transport Modes

(Professor Gordon C. Shaw)

Sociological Research in Transportation

(Professor John O'Neill, Chairman, Department of Sociology)

The Department is interested in transportation problems of urban industrialized areas. A number of members are experienced in underdeveloped countries and might also focus some attention on general problems of communication including specific transportation problems. Such studies would very likely adopt a comparative perspective whether regional or international. An example is the following:

Urban Population Deconcentration and the Journey to Work

(Professor A.G. Darroch)

4.3.2 Research Proposals for which Considerable Faculty Capabilities and Interests Exist

Studies of Total Transport System (see Section 4.2.1.)

Development of Integrated Transport Planning, Programming, Budgeting and Management Control Systems in the Transport Sphere

Transport project evaluation, investment criteria and decisions, PPBS applications in transport, continuous monitoring (cybernetic control loop) information devices for transport planning, decision-making, implementation and follow-up. Applications of the concepts and tool of modern management science.

Studies of Modern Transport Data Systems

Information requirements, new field survey techniques (aerial photography, mass O-and-D surveys, physical input-output studies in rest of economy as a guide to transport flow analysis, highway photo inventory) and their benefits and costs; geocoding; multipurpose data banks; computer aspects; data processing and utilization; case studies; specifications for effective transport planning data systems. The creation of transport data banks and remote computer terminal systems (e.g. for the joint use of DBS, the Canadian Transport Commission, the University of Toronto, York University, other Canadian and international universities) offers great promise for the future. Possibilities should be studied as part of this project.

Studies in the Economics of Transport

(as shown under Professor Andreas Papandreou in Section 2.3).

Sociological Aspects of Transportation

(as shown under Professor John O'Neill, Section 2.3, and to be combined with expertise from the fields of geography, economics and environmental studies).

Review of Fundamental Concepts in National Transport Policy and Legislation
(in conjunction with projects proposed in more detail by Professors Feltham, Day, Studnicki-Gizbert and others).

The establishment of operationally and legally valid definitions for such terms as transport coordination and integration; a balanced transport system; economic, efficient, adequate and safe transport services. Review of economic versus financial versus social desiderata in transportation. The problem of incommensurable transport inputs and outputs; direct and indirect costs and benefits; externalities and spill-over effects; social versus individual costs and benefits. The scope for social indicator use in the transport sphere.

Selected Empirical Studies

Empirical studies in a wide variety of areas within the transport spheres, employing expertise existing at the University of Toronto and York University, can be arranged to suit the specific research and training interests of the Canadian Transport Commission. Motivated graduate students on thesis or summer stipend research under the supervision of qualified faculty can often produce excellent field research results. As an example, a York University graduate in geography was placed for summer work with Canada's largest trucking company. He succeeded in generating significant original findings on the extraordinarily high costs of urban freight collection and delivery.

The Institute for Behavioural Research at York University constitutes another important resource. Sample public opinion surveys across Canada, for instance on the adequacy of air transport or urban transport services, could be undertaken. Newer types of "preference polling", for instance

on alternative, realistically simulated future urban or regional transport plans, could also be attempted.

4.4 Conclusions

The preceding sections constitute the research suggestions of the University of Toronto and York University - - topics for which there is much interest on both campuses.

All of the research is to be undertaken within a framework which facilitates the interaction of ideas and information between disciplines and between component studies. To varying degrees, all of the suggested research is mission oriented. A close working relationship between the sponsor and the universities is both welcomed and encouraged.

Highly detailed, specific proposals have been avoided. The intent has been rather to present an array of complementary research alternatives from which a subset of mutual interests to the Canadian Transport Commission and the universities can be subsequently selected.

5. ACADEMIC ORGANIZATION AND SUPPORT STRENGTH

5.1 The University of Toronto

5.1.1 The Existing Interdepartmental Programme in Transportation

In January 1969 the Departments of Civil and Industrial Engineering and the Department of Aerospace Studies investigated the formulation of a joint graduate programme in transportation, with the objective of providing an integrated academic and research programme in transportation within the Faculty of Applied Science and Engineering. On the basis of these discussions a programme of study was set up which coordinated existing engineering courses in transportation, thereby offering students an integrated approach to transportation problems; an approach which is difficult to develop within the confines of any one department. The academic staff members which are presently involved in this programme are the following:

J.W. Abrams, Department of Industrial Engineering
B. Bernholtz, Department of Industrial Engineering
J.A. Buzacott, Department of Industrial Engineering
A.A. Cunningham, Department of Industrial Engineering
M.M. Davis, Department of Civil Engineering
B. Etkin, Department of Aerospace Studies
T.A. Lambe, Department of Industrial Engineering
M.J.M. Posner, Department of Industrial Engineering
L.D. Reid, Department of Aerospace Studies
R.G. Rice, Department of Civil Engineering
G.N. Steuart, Department of Civil Engineering
P.A. Sullivan, Department of Aerospace Studies
J.G.C. Templeton, Department of Industrial Engineering
A.K.F. Turner, Department of Civil Engineering

5.1.2 Development of an Expanded Programme in Transportation

At the present time there are several other departments within the University of Toronto which offer courses pertinent to transport studies, and for a number of years graduate students have sought courses outside their own department in order to prepare a more comprehensive study programme. In order to coordinate and develop this informal structure the interdepartmental programme in engineering is expanding its present organization to include all departments at the university which have an interest in transport studies.

Favourable response and discussion has been received from a large number of departments at the university and an inter-faculty steering committee is now being formulated. The departments and centres which will be represented are the following:

Department of Aerospace Studies

Department of Chemical Engineering and Applied Chemistry

Department of Civil Engineering

Department of Economics

Department of Geography

Department of Industrial Engineering

Department of Mechanical Engineering

Department of Physics

Department of Political Economy

Institute for the Quantitative Analysis of Social and Economic Policy

Department of Sociology

Department of Urban and Regional Planning

Centre for Urban and Community Studies

It will be the task of the steering committee to assess further the research and teaching resources of the University of Toronto and to outline

the objectives, scope and organizational framework of the emerging interdisciplinary programme in transport studies. At the present time the objectives of the group would appear to be:

- (i) to improve the coordination of teaching in transport studies for the benefit of both academic staff and graduate students, and to promote the efficient utilization of laboratory facilities and teaching staff;
- (ii) to coordinate the research interests and capabilities in transport research at the University of Toronto and to make these available for the conduct of significant research programmes; and
- (iii) to promote and conduct research projects on transport problems, with particular reference to problems peculiar to or of prime interest to Canada.

It is intended at this stage that the scope of the inter-faculty group be defined quite broadly, so that all stated interests in transportation might be accommodated. Transportation is therefore defined broadly as incorporating the phases of planning, design, and operation of transport systems for the movement of people and commodities.

In summary, the establishment and development of an organized group at the University of Toronto is now underway and in the next month this group should achieve a more formal status. Support is expected to be forthcoming from many of the departments concerned. Also, further negotiations will be conducted with the York University Transport Centre to explore the already promising prospect of a cooperative interdisciplinary programme in transport studies.

5.1.3 Research Support

Related Institutes

It is anticipated that research support for transport studies would be forthcoming from two existing centres at the University of Toronto. Both the Centre for Urban and Community Studies and the Institute for the Quantitative Analysis of Social and Economic Policy have expressed an interest in transportation research relating to their own spheres of study. Both of these organizations are active and presently involved in research and could provide assistance in the estimation of exogenous inputs as might be required by any transportation research undertaken.

Computer Facilities

Due to the large data handling and analysis requirements of research studies in transportation, the existence of suitable computational services is of prime importance. At the University of Toronto computer services are supplied by the Institute of Computer Science and are available for research and teaching departments and centres at the university. The main computers in the Institute of Computer Science are two IBM 360 Model 65's and an IBM 7094 II and each of these works under the control of an operating system which provides a wide range of language processors and libraries. In addition, special production control systems provide remote multi-access, job queueing and priority scheduling features. Standard input-output services are provided at one central service area and at eight decentralized locations throughout the St. George, Scarborough and Erindale campuses. More recently, time-sharing terminals (IBM 2741's) have been and are being installed.

The following auxiliary equipment is also available at the University of Toronto:

1. PDF 8 Media Conversion System for the conversion of paper tape information to magnetic tape.
2. EAM Services (card reproduction, mark sense reading, interpreting and collating).
3. Calcomp Plotter (30 inch drum plotter)
4. Lister, sorter and keypuncher
5. 2741 CPS time-sharing terminals
6. 2260 Video terminal for special project work

Library Facilities

The University of Toronto has one of the finest libraries in North America ranking ninth in size (about 3 million volumes) and first in annual acquisitions. In addition to the main collection, departmental libraries in Engineering and Urban and Regional Planning are of particular significance to transportation research. The University of Toronto is one of the corporate members of the Center for Research Libraries in Chicago which makes almost 3 million additional research items readily available.

Within brief walking distance of the University of Toronto campus is the Government of Ontario Legislative Library which contains many materials which are very relevant to transportation research on the Southern Ontario-Quebec Region. Planning libraries (City and Metropolitan) also have collected many research reports and data on transportation planning.

5.2 York University

5.2.1 The York University Transport Centre

(a) The York University Transport Centre was constituted with the approval of the Senate and the Board of Governors of the University in May 1969. It pursues these general objectives:

- to promote, support and co-ordinate programmes relating to transport
- to promote and co-ordinate independent, advanced research on transport matters
- to stimulate interdisciplinary teaching and research applications to urban, regional, national and international transport and related problems
- to carry out a publications programme in the field of transport, including assistance in editing, determining format and circulation
- to organize and conduct academic, professional and public service colloquia, seminars, lectures and training programmes
- to facilitate liaison with other universities, research agencies and government organizations active in the transport field, both nationally and internationally.

The Transport Centre, interdisciplinary in nature, has a guiding Council with the following membership at present:

CHAIRMAN: Dr. Ivan R. Feltham, Osgoode Hall Law School

DIRECTOR OF THE CENTRE: Dr. Tillo E. Kuhn, Professor of Economics

MEMBERS: Dean Gerald Carrothers, Faculty of Environmental Studies

Dean Michael Collie, Faculty of Graduate Studies

Dr. James Cutt, Department of Economics

Dr. John Day, Osgoode Hall Law School

Dr. Tait Davis, Department of Geography

Dean James Gillies, Faculty of Administrative Studies

Dr. Michael D. Goldrick, Department of Political Science

Dr. Ronald K. House, Department of Economics

Dr. William A. Jordan, Faculty of Administrative Studies

Dr. Harold Kaplan, Department of Political Science

Dr. Neil M. McArthur, Atkinson College, Department of
Geography

Dr. Graeme McKechnie, Department of Economics

Dr. David McQueen, Department of Economics, Glendon
College

Dr. Alex Murray, Department of History

Dr. John O'Neill, Department of Sociology

Dr. Andreas Papandreou, Department of Economics

Dr. Frederick F. Schindeler, Department of Political
Science, Institute of
Behavioural Research

Dr. Gordon C. Shaw, Faculty of Administrative Studies

Dr. Konrad Studnicki-Gizbert, Department of Economic

Dr. Roy I. Wolfe, Department of Geography

(b) The Centre, with its predecessor organization at York University, The Vice-President's Committee on Canadian Transport Studies, has in the past benefitted greatly from the generous support of the Canadian Transport Commission and The Educational Foundation of the Automotive Transport Association of Ontario. It should be recorded here with sincere gratitude that the Educational Foundation has up to now donated close to \$50,000 in free research money since 1966, precisely at a time in York University's

development when such support was most needed and yet to hard raise by a young institution. In recent discussions, the executives of The Educational Foundation of the Automotive Transport Association of Ontario indicated their willingness to continue their grants for the York University Transport Centre on a larger scale and, in addition, set aside sums for specific projects, library and research support purposes. Other potential non-governmental donors are interested to advance the Transport Centre's objectives. It stands to reason that the proposed University of Toronto - York University joint transport programmes would appeal to yet further sponsors in the Toronto area and elsewhere. It may therefore be stated that York University is prepared, as tangible evidence of commitment, to supplement support received in future from the Canadian Transport Commission with funds from other sources.

(c) Made possible by the generosity of the Canadian Transport Commission and The Educational Foundation of the Automotive Transport Association of Ontario, the Transport Centre is offering Fellowships to qualified graduate students with strong interests in the transport sphere. This assistance is beginning with the academic year 1969-70.

(d) The York University Transport Centre organized a colloquium on urban mobility in the spring of 1969, to which several outstanding experts contributed. The colloquium proceedings will be published in the near future. Several other Transport Centre publications are under way and a second colloquium is planned for this fall.

5.2.2 The Transportation Law Journal

The Journal brings to the carrier and the lawyer, the judge and the administrator, the professor, student and researcher, a forum for the

examination of important legal and policy aspects of transportation. It is published by the Motor Carrier Lawyers Association in cooperation with Osgoode Hall Law School of York University. The Chief Editor is Professor Daniel J. Baum of Osgoode Hall Law School, and the Board of Editors includes five professors from this School, all with strong transport expertise and interests.

5.2.3 Library and Computer Services

The book collections in the libraries of York Universities are growing at a rate of more than 70,000 volumes a year and will soon number 400,000 volumes. Considerable material of relevance for transport teaching and research already exists, including the principal scholarly, professional and trade journals in the field of transportation. While the York University libraries now have a sufficient collection to support considerable transport teaching and research, further expansion and specialization can be easily accomplished as the activities of the Transport Centre and its members develop over the years.

York University has expanding, well-equipped computer services and remote terminal facilities, which meet all foreseeable requirements. Data bank and remote terminal arrangements for transport research purposes with the Dominion Bureau of Statistics, the Canadian Transport Commission, the University of Toronto and other knowledge centres may well become an interesting possibility in future.

5.2.4 The Institute for Behavioural Research of York University

This Institute is of special interest in the present context since it is well equipped to carry out on a contract basis large-scale surveys

in both official languages anywhere in Canada, for instance, on responses of transport users to different service offerings, or to future transport plans. As the only institute of its kind in Canada, it constitutes a strategic research resource.

(a) Description

The Institute for Behavioural Research is a research unit of York University established in 1965 to facilitate large-scale and inter-departmental research in the behavioural sciences. Its three main divisions, the Data Analysis Section, the Survey Research Centre, and the Data Bank offer a variety of services to social scientists both inside and outside the University. The Institute also acts as a coordinating body for social science research projects being conducted within the York academic community. Recent developments at the Institute have been impressive and signal an important role for it in the future of social science research at York and in Canada.

(b) Data Analysis Section

The Data Analysis Section primarily offers centralized data processing services to social science researchers. Early consultation with the Data Analysis Section permits the researcher to develop his project in such a way that the data will be processed quickly and easily. Problems in such areas as questionnaire design and coding can be dealt with quickly and effectively by the Section's trained and experienced staff. The Data Analysis Section has several keypunch and verifier machines and a counter-sorter in its machine room. Actual data analysis is done at the York University Computer Centre, using an IBM/360 Model 50 computer. The Section also has developed a number of general-purpose

computer programmes for researchers. A list of the programmes, with a brief description of their capabilities, and instructions for the proper punching of control, parameter, and data cards, is available from the Institute on request. Thus the researcher may make use of these programmes without further notifying the Data Analysis Section. However, should he wish, the Data Analysis Section can keypunch the data cards and submit the job to the Computer Centre for him. The Data Analysis Section has full-time keypunch and stenographic personnel, as well as a programmer who can adapt a general-purpose programme to the individual needs of the researcher. In some cases, subject to staff time limitations, special-purpose programmes can be written.

(c) Survey Research Centre

The Survey Research Centre, which is the first academic organization of its kind in Canada, was founded in the academic year 1967-68 and undertook its first contract research in the spring of 1968. The Centre provides complete survey research services for academic researchers attached to a university or other non-profit organization.

The Centre will assist in study design, sampling, interviewing and coding. Data analysis is done through the Data Analysis Section of the Institute for Behavioural Research. At present the Centre has a staff of 125 trained interviewers throughout the province of Ontario, 40 in Winnipeg, Manitoba, and 40 in Vancouver, British Columbia, and is prepared to execute studies in any province as a whole or in any part of it. The interviewing staff is multi-lingual and the Centre prepares its survey instruments in both official languages of Canada.

It is anticipated that the Centre will offer courses in Survey Research Techniques and Methodology beginning in the summer of 1970. Those

who satisfactorily complete these specialized courses will receive credit in the Graduate Programme in Sociology.

(d) Data Bank

The Data Bank of the Institute for Behavioural specializes in Canadian data. It presently contains all the data from surveys conducted by the Canadian Institute of Public Opinion as well as data from other survey research projects conducted in Canada. In addition, aggregate data from the Multiple Listing Service of the Toronto Real Estate Board and the Dominion Bureau of Statistics are being added continuously. Social scientists throughout Canada are being contacted to contribute their data to the Bank. The Institute holds membership, on behalf of the University, in the Inter-University Consortium for Political Research, the Toronto Area Research Conference, the International Survey Library Association of the Roper Public Opinion Research Centre, and the Council of Social Science Data Archives. The Institute has contacts with many other data banks and survey research organizations around the world and offers a liaison service between these data sources and the York University community.

5.2.5 Outside Liaison and Collaboration

York University and its Transport Centre have from the start promoted national and international cooperation in transport matters. Continuous liaison with transport interests at the University of Manitoba, University of Toronto, Nova Scotia Technical College, Université de Montréal, Université de Laval and Université de Sherbrooke has been maintained. Colleagues from these universities have visited York University and the

Director of the York University Transport Centre has spoken at seminars at some of these institutions upon invitation. Excellent working relationships on transport matters exist with the United Nations, the International Bank for Reconstruction and Development, the Inter-American Development Bank, the Brookings Institution, the U.S. Departments of Transport, the Institute for Transportation and Traffic Engineering at the University of California, Berkeley, and others. The Director of the York Centre serves on advisory groups of the Canadian Transport Commission and the Transport Center of the University of Manitoba. He is a member of the Institute of Transport in the United Kingdom and the Canadian Transportation Research Forum. The other members at the Transport Centre are likewise most active in their professional fields and serve with distinction in various organizations related to transport.

6. CONCLUSIONS

The University of Toronto and York University are enthusiastic to develop joint transport teaching and research programmes under the auspices of the Canadian Transport Commission.

By combining the academic and research support resources of our neighbouring institutions, we are confident that we can attain the highest standards of excellence. We are prepared to assign high priority to collaborative transport activities and, as tangible evidence of commitment, to supplement funds made available by the Canadian Transport Commission under agreed programmes with support drawn from other sources.

Considering the great size and pervasive influence of the transport sector in Canada, it may be said that both the universities and the public authorities have in the past badly neglected transport teaching and research. It is important that there be rapid progress in this sphere now. However, there are many claims from all sides on scarce university resources. There must be evidence of definite public interest and solid, sustained financial support by government to persuade the best scholars and graduate students to work on transport problems.

The University of Toronto and York University are most hopeful that the Canadian Transport Commission will provide initiative and support in this hitherto neglected field. They stand ready to work creatively together.

APPENDIX I

CURRICULA VITARUM FOR UNIVERSITY OF TORONTO STAFF MEMBERS

DEPARTMENT OF AEROSPACE STUDIES

BERNARD ETKIN

Professional Interests

- a) Aerodynamics of Aircraft, Performance, Stability and Control.
- b) The Effects of Turbulence on Aircraft and Propellers.
- c) The Dynamics of Drifting and Blown Snow.

Education

B.A.Sc.	Engineering Physics	University of Toronto	1941
M.A.Sc.	Aeronautical Engineering	University of Toronto	1947

Academic and Related Experience

Appointed Chairman, Division of Engineering Science, 1967.

Appointed Professor, Institute for Aerospace Studies, 1957.

Appointed Associate Professor in Aeronautical Engineering, 1953.

Appointed Assistant Professor in Aeronautical Engineering, 1948.

Appointed Lecturer in Aeronautical Engineering, 1942.

Elected Member, Commission on University Government, 1969.

Elected Member of University Senate, and of its Executive Committee 1964.

Director of AERCOL, Aerospace Engineering and Research Consultants Limited, Concord P.O., Ontario (1966); President (1966-68); Vice-President 1968-.

Member of N.R.C. Associate Committee on Aerodynamics 1961-65. (Chairman of Committee for 1962).

Part time employee and consultant in Canadian Aircraft Industry and Associated Firms, 1940.

Publications (Selected)

"Dynamics of Flight - Stability and Control", John Wiley and Sons, N.Y., 1959 (a reference/text book).

"Problems of Flight in Low-Level Turbulence" with J. Clodman. Proceedings of the First Canadian Congress on Micrometeorology, Toronto, April, 1965.

"Dynamics of Aerospace Vehicles - A Quarter Century of Change and Two Current Problems". The 1965 W. Rupert Turnbull Lecture of the CASI. CASI Jour. 11, 8 October 1965.

"Theory of the Response of a Slender Vertical Structure to a Turbulent Wind with Shear". Proceedings of NASA Conference on Wind Load Problems of Launch Vehicles. June, 1966.

"Dynamics of Flight Vehicles". General Lecture presented to Canadian Congress on Applied Mechanics, Laval University, May 1967. Published in the Congress Proceedings.

"The Response of a Cylindrical Structure to a Turbulent Flow Field at Subcritical Reynolds Number" (with A.C. Campbell). UTIAS Tech. Note 115, December 1966.

"Explanation of the Anomalous Spin Behaviour of Satellites with Long Flexible Antennae" (with P.C. Hughes). Jour. Spacecraft and Rockets 4, 9, September, 1967.

LLOYD D. REID

Professional Interests

- a) Flight Transportation as it Applies to Canada.
- b) Human Control of Aircraft.
- c) Operational Aspects of Aircraft.
- d) Air Traffic Control.

Education

B.A.Sc.	Engineering Physics	University of Toronto	1964
M.A.Sc.	Aerospace	University of Toronto	1965
Ph.D.	Aerospace	University of Toronto	1969

Academic and Related Experience

Assistant Professor, Aerospace Studies, 1969-.

Lecturer, Aerospace Studies, 1967-69.

Special Lecturer, Aerospace Studies, 1965-67.

Consultant to Industry as a Director of Aerospace Engineering and Research Consultants Limited, 1969-.

Publications

"The Design of a Facility for the Investigation of Human Pilot Dynamics", UTIAS TN-95, 1965.

"The Measurement of Human Pilot Dynamics in a Pursuit-Plus-Disturbance Tracking Task" UTIAS Report No. 138, 1969.

PHILIP A. SULLIVAN

Professional Interests

- a) The Investigation and Development of Air Cushion Vehicle (ACV) Technology and Landware for Canadian use.
- b) The Transportation Systems Aspects of ACV's.

Education

Bachelor of Engineering	Mechanical Engineering	New South Wales Australia	1959
Master of Engineering Science (M.E.)	Aeronautical Research	New South Wales	1961
Diploma of Imperial College (D.I.C.)	Aeronautical Research	Imperial College of Science and Technology, London, England	1963

Academic and Related Experience

Assistant Professor, Research Associate (Post Doctoral), Gas Dynamics Laboratory James Forrestal Research Center, Aerospace Studies, Princeton University, 1965-, 1964-65.

Research Assistant, Aeronautics, Imperial College of Science and Technology, 1962-63.

Director of Aerospace Engineering and Research Consultants Limited, 1965-.

Publications

Sullivan, P.A., On Hypersonic Flow Over Slender Double Wedges, AIAA Journal, pp. 1927, August 1963.

Sullivan, P.A., Inviscid Hypersonic Flow on Cusped Concave Surfaces, J. Fluid Mech. Vol. 24, Part 1, (1966, pp. 99-112).

Sullivan, P.A., On the Interaction of a Laminar Hypersonic Boundary Layer and a Corner Expansion Wave, AIAA Paper 69-137 (January 1969).

DEPARTMENT OF CHEMICAL ENGINEERING AND APPLIED CHEMISTRY

MICHAEL E. CHARLES

Education

B.Sc.	Chemical Engineering	University of London	1957
Ph.D.		University of Alberta, Edmonton	1963

Academic and Related Experience

Associate Professor, Department of Chemical Engineering and Applied Chemistry, University of Toronto, 1964-.

Director, Chemical Engineering Research Consultants Limited.

Production Research Department, Imperial Oil Limited, Calgary, 1963-64.

Sessional Instructor, Department of Chemical and Petroleum Engineering, University of Alberta, Edmonton, 1961-63.

Junior Research Officer, Petroleum Research, Research Council of Alberta, Edmonton, 1957-61.

Publications (Selected)

"Critical Fluid Velocity and Power Requirement for the Startup of a Capsule Pipeline". O. Figueiredo and M.E. Charles. Can. Jour. Chem. Eng., 46, 62 (1968).

"Limiting Values of the Nusselt Number for Heat Transfer to the Pipeline Flow of Non-Newtonian Fluids with Arbitrary Internal Heat Generation". J. Sestak and M.E. Charles. Chem. Eng. Prog. Symp. Series, 64, No. 82, 212 (1968).

"An Approximate Solution for the Startup Flow of a Power Low Fluid in a Tube". J. Sestak and M.E. Charles. Chem. Eng. Sci. 23, 1127 (1968).

"Hagenbach Factor Prediction for Flow of Non-Newtonian Fluids in Pipes".
J. Sestak and M.E. Charles, Acta Technica CSAV, pp. 25, No. 1 (1969).

"The Use of a Heavy Media in the Pipeline Transport of Particulate Solids".
R.A. Charles and M.E. Charles, Proc. Int. Symp. on Solid-Liquid Flow in
Pipes (in press).

DEPARTMENT OF CIVIL ENGINEERING

MERRITT M. DAVIS

Professional Interests

Structural Design of Roadways, Roadway Materials, Geometric Design,
Road Safety and Accident Analysis.

Education

B.Sc.	Civil Engineering	Queen's University	1945
M.Sc.	Civil Engineering	Purdue University	1949

Academic and Related Experience

Assistant and Associate Professor, Department of Civil Engineering,
University of Toronto 1956-.

Research Engineer, Materials and Research Section Ontario Department of
Highways, 1951-56.

Publications

M.M. Davis, "Field Study of Methods of Preventing Reflection Cracks in
Bituminous Resurfacing of Concrete Pavements," Ontario Joint Highway Research
Programme, Report #12, 1960.

G.D. Campbell, and M.M. Davis, "Report and Discussion of Preliminary Results,"
work of C.G.R.A. Committee on Pavement Design and Evaluation, Proceedings
C.G.R.A., 1960.

M.M. Davis and K.M. Williams, "Vehicle Operating Characteristics on Outer
Loop Deceleration Lanes of Interchanges," Ontario Joint Highway Research
Programme, Report #43, 1968.

M.M. Davis, "Engineering Investigation of Road Accidents on Site," Committee
on Road Safety Research, Engineering Institute of Canada, October, 1968.

RONALD G. RICE

Professional Interests

- a) Land-Use and Transportation Simulation Techniques, the Requirements for their Utility in Urban and Regional Planning.
- b) Transportation Systems Evaluation Methodology.
- c) Performance Characteristics and Capabilities of New Transport Technology.

Education

B.A.Sc.	Civil Engineering	University of Toronto	1962
S.M.	Civil Engineering (Transportation Engineering)	Massachusetts Institute of Technology	1964
Dipl. T. & R. Pl.	Town and Regional Planning	University of Toronto	1966

Academic and Related Experience

Lecturer, Department of Civil Engineering, University of Toronto - present.

Ph.D. Candidate, Department of Civil Engineering, University of Toronto - present.

Transportation Planner with Traffic Research Corporation, (KCS Limited), in Leeds, England, 1966.

Transportation Planner with Traffic Research Corporation, (KCS Limited), in Toronto, Ontario, 1965.

Transportation Research Engineer with Traffic Research Corporation, (KCS Limited), in Toronto, Ontario, 1963.

Junior Traffic Engineer with the Ontario Department of Highways, Downsview, 1962.

Publications

"Procedures for the Mechanical Analysis of Traffic Volume Counter Punched Tapes via Computer Methods," Ontario Department of Highways Report, 1962.

"Development of the Monorail as a System of High-Speed Mass Transportation," B.A.Sc. Thesis, University of Toronto, 1962.

"Public Transportation in Urban Areas: Analysis and Expectations," S.M. Thesis, Massachusetts Institute of Technology, 1964.

"Urban Form and the Cost of Transportation: The Policy Implications of Their Interaction," PLAN, Vol. 10, No. 2, Journal of the Town Planning Institute of Canada, July, 1969.

GERALD N. STEUART

Professional Interests

Air Transportation Design and Analysis, Urban Transportation Planning, Theory of Traffic Flow.

Education

B.Sc.	Civil Engineering	University of Saskatchewan	1959
M.Sc.	Civil Engineering	University of California, Berkeley	1967
Ph.D.	Transportation Engineering Div., Civil Engineering	University of California, Berkeley	1969 (expected)

Academic and Related Experience

Research Assistant, Institute of Transportation and Traffic Engineering, University of California, Berkeley, 1968-69.

Assistant Professor, University of Toronto, 1969-.

Research Engineer, Boeing Company, Renton, Washington
Staff Engineer, Ranking and Hill, Consulting Engineers, Sydney, Australia
Traffic Engineer in Dunedin, New Zealand for DeLeuw, Cather and Co.
Traffic Engineer, Sydney, Australia, 1967.

Staff Engineer in Wellington and Auckland, New Zealand, 1962-66.

Engineer and Designer in Regina, Saskatchewan, 1959-61.

Publications

G.N. Steuart, "An Investigation of the Operating Policies on Gate Positions at Large Metropolitan Airports" Ph.D. Thesis 1969.

A. KEITH F. TURNER

Professional Interests

- a) Transportation Planning and Engineering Geology - particularly the Relationships between Geologic Controls and Regional Developments. This Includes "Urban Geology" and Resource Conservation.
- b) Location and Design of Regional Transportation Systems.

- c) Engineering Applications of Aerial Reconnaissance - Remote Sensing Techniques - Particularly Applications of New Films and Sensors Operating Outside the Visible Range.
- d) Computer Applications in the Above Three Fields.

Education

B.Sc.	Geological Sciences	Queens University	1963
M.A.	Geology	Columbia University	1964
Ph.D.	Civil Engineering	Purdue University	1969

Academic and Related Experience

Assistant Professor, Department of Civil Engineering, University of Toronto, 1969-.

Visiting Assistant Professor and Post-Doctoral Research Assistant, Joint Highway Research Project, Purdue University, 1968-69.

Employed as Engineering Geologist, Testing Laboratories, Department of Public Works, Ottawa 1966-69.

Consulted as Staff Engineering Geologist, Atlantic Tidal Power Programming Board, Halifax 1967-69.

Publications

"Terrain Analysis by Computer", A.K. Turner and R.D. Miles, Proceedings of the Indiana Academy of Science, Vol. 77, pp. 256-270, 1968.

"FORTRAN IV Programs to Develop Contour Maps of Three Dimensional Data", A.K. Turner, Clearinghouse for Federal Scientific and Technical Information, 1968.

"Analysis of Ground Water Use and Replenishment, and Aquifer Characteristics in Bartholomew County, Indiana, L.G. Davis, A.K. Turner, W.N. Melhorn; Purdue University, Water Resources Research Center, Technical Report 3, June 1969, pp. 83.

"The GCARS System FORTRAN IV Users Manual", A.K. Turner Joint Highway Research Project Report 24, September 1969, Purdue University, Lafayette, Indiana.

"The GCARS System FORTRAN IV Programmers Manual", A.K. Turner (in 3 parts) Joint Highway Research Project Reports 25, 26 and 27, September 1969, Purdue University, Lafayette, Indiana.

"Computer-Aided Regional Highway Location Studies", A.K. Turner and R.D. Miles, Proceedings AASHO Committee on Electronics, National Conference 1969, pp. 36-74, May 1969.

DEPARTMENT OF GEOGRAPHY

ROSS D. MACKINNON

Professional Interests

- a) Dynamic Optimal Transportation Network Models.
- b) Spatial Consequences of Transportation Investments.
- c) Descriptive Models of the Dynamics of Network Structure, Transportation Investment, and Accessibility Patterns.
- d) Models for the Optimal Location, Utilization and Integration of a System of Airports.

Education

B.A.	University of British Columbia	1964
M.S.	Northwestern University	1966
Ph.D.	Northwestern University	1968

Academic and Related Experience

Assistant Professor, Department of Geography.

Research Associate, Centre for Urban and Community Studies, University of Toronto 1968-.

Research Assistant, Transportation Center at Northwestern University on National Cooperative Highway Research Program on Transportation Plan Evaluation, 1966-67.

Research Assistant on Regional Science Institute and Bureau of Public Roads Projects 1965.

Publications

"Chapter IX" in The Transportation Center, Strategies for the Evaluation of Alternative Transportation Plans, Final Report prepared for the National Cooperative Highway Research Program, Project 8-4 (Evanston, Illinois: 1967).

"The Concept of Flexibility and Urban Systems". Discussion Paper No. 5, Center for Urban Studies, University of Illinois at Chicago Circle, Chicago, Illinois.

"Dynamic Programming and Geographical Systems," Research Report No. 13, Bell Environment Study, Centre for Urban and Community Studies, University of Toronto, 1969 (to be published in a special issue of Economic Geography, 1970).

"Some Simple Transportation Network Generation Models for Southern Ontario and Quebec," Research Report, Bell Environmental Study, Centre for Urban and Community Studies, University of Toronto, 1969.

ALLEN J. SCOTT

Professional Interests

- a) Methods of Combinatorial Optimization and Their Application to Basic Planning and Design Problems, e.g. Optimal Networks and Locational Problems.
- b) Models for the Optimal Location, Utilization and Integration of a System of Airports.
- c) Analysis of Location - Allocation Systems, and Methods of Computing Solutions.

Education

B.A.	Geography	Oxford University	1961
M.A.	Geography and African Studies	Northwestern University	1962
M.A.	Geography	Oxford University	1965
Ph.D.	Geography	Northwestern University	1965

Academic and Related Experience

Associate Professor of Geography, University of Toronto, January 1969.

Visiting Lecturer, Department of Town Planning, University College London, and Honorary Research Associate of the University of London, 1967-68.

Research Associate of the Regional Science Research Institute; Research Performed at London University, January, 1967. December 1968. (On Leave of Absence from University of Pennsylvania).

Assistant Professor for Regional Science, University of Pennsylvania July, 1965 December, 1968.

Joint Secretary of British Section of the Regional Science Association, 1966-69.

Founder of British Section of the Regional Science Association, 1966.

Publications (Selected)

A Class of Network Optimizing Processes for Spatial Analysis. Unpublished Research Report, Regional Science Research Institute, 1968.

Functional and Spatial Structure of the Central City: A Mathematical Theory and an Empirical Test. Graduate School of Geography, London School of Economics, Discussion Papers, No. 16, 1968.

Approaches to the Solution of the Optimal Network Problem. Unpublished Research Report, Regional Science Research Institute, 1968.

Combinatorial Processes, Geographic Space, and Planning, Department of Town Planning, University College London, Discussion Paper Series No. 1, 1968.

"On the Optimal Partitioning of Spatially Distributed Point Sets". In: Studies in Regional Science, London: Pion Ltd., (Allen J. Scott, ed.,) 1969.

Editor of Studies in Regional Science, 1969, London Papers in Regional Science. London: Pion Ltd.

A Bibliography on Combinatorial Programming Methods and Their Application in Regional Science and Planning. Centre for Urban and Community Studies, University of Toronto, Report No. GS-1, 1969.

JAMES W. SIMMONS

Professional Interests

- a) Description and Evaluation of Urban Places in Canada - their Location, Economic and Social Roles Using Multivariate Techniques.
- b) Description and Analysis of the Interactions Among Urban Places.
- c) Development of a Dynamic Model for the Urban System in Canada which Could Simulate the Future Growth of Urban Places Given Certain Assumptions About Environmental Changes.

Education

B.Sc.	Geophysics	University of Western Ontario	1959
M.A.	Geography	University of Chicago	1962
Ph.D.	Geography	University of Chicago	1964

Academic and Related Experience

Associate Professor, Department of Geography, University of Toronto, 1969.

Associate Professor, Department of Geography, University of Toronto and jointly, Associate Professor, Ontario Institute for Studies in Education 1967-69.

The Geography Institute for Small Southern Colleges, Clark University, Saul Cohen, Director 1966.

Associate Professor, Department of Geography, University of Western Ontario, 1966-67.

Assistant Professor, Department of Geography, University of Western Ontario, 1964-66.

Lecturer, Department of Geography, University of Western Ontario, 1963-64.

Joint Chairman, Canadian Association of Geographers, Census Advisory Committee, 1967-.

Councillor, Canadian Association of Geographers, 1966-69.

Publications (Selected)

"Changing Residence in the City: A Review of Intra-Urban Mobility",
Geographical Review, LVIII, (October, 1968), pp. 622-651.

"An Urban Information Field", Ontario Geography, No. 2, (1968) pp. 35-48.

With Brian J.L. Berry and Robert J. Tennant, "Urban Population Densities:
Structure and Change", Geographical Review, LII, (June 1963) pp. 389-405.

With R.K. Dolling, J.W. Greenall, I.A. Nausedas, and E.S. Spence,
"The Structure of Land Use: London Ontario", Ontario Geography (forthcoming).

With Rober E. Simmons, Urban Canada, (Toronto: Copp Clark, 1969).

With Victor H. Huebert, "The Location of Public Land Use in Urban Areas",
Canadian Geographer, (forthcoming).

DEPARTMENT OF INDUSTRIAL ENGINEERING

BEN BERNHOLTZ

Education

B.A.	Math and Physics	University of Toronto	1948
M.A.	Mathematics	University of Toronto	1949
Ph.D.	Mathematics	California Institute of Technology	1952

Academic and Related Experience

Chairman, Department of Industrial Engineering, University of Toronto 1968-.

Visiting Professor, Department of Engineering Economic Systems, Stanford
University 1968.

Professor, Department of Industrial Engineering, University of Toronto 1966-.

Associate Professor, Department of Industrial Engineering, University of
Toronto 1962-66.

Lecturer in Statistics, Div. of University Extension, University of
Toronto 1960-65.

Lecturer, Department of Mathematics, University of Connecticut 1952-53.

Operations Research Analyst, Research Division, Hydro-Electric Power Commission of Ontario 1955-62.

Mathematician, Research Division, Hydro-Electric Power Commission of Ontario 1953-55.

Consulting to Government and Industry.

Publications (Selected)

Bernholtz, B., Shelson, W., and Kesner, O., "A Method of Scheduling Optimum Operation of Hydro's Sir Adam Beck-Niagra Generating Station", AIEE Transactions, Vol. 77, Part III, December 1958. pp. 981-991.

Bernholtz, B., "Optimum Allocation of Discharge to Units in a Hydro-Electric Generating Station," SIAM Review (Soc. for Industrial and Applied Maths.), Vol. 2, 1960, pp. 247-258.

Bernholtz B., and Graham L.J., "Hydrothermal Economic Scheduling. Part I. Solution by Incremental Dynamic Programming," Trans. of Am. Inst. of Elec. Engrs., Part III, 79 pp. 921-923 (1960).

Bernholtz, B., and Graham L.J., "Hydrothermal Economic Scheduling. Part V. Scheduling a Hydrothermal System with Interconnections," IEEE Trans. on Power App. and Systems, June 196-, pp. 249-255.

Bernholtz B., "A New Derivation of the Kuhn-Tucker Conditions," Operations Research, Vol. 12, pp. 295-299 (1964).

Posner, M.J.M., and Bernholtz, B., "Two Stage Closed Queueing Systems with Time Lags", CORS Journal Vol. 5, pp. 82-89 (1967).

THOMAS A. LAMBE

Education

B.A.Sc.	Electrical Engineering	U.B.C.	1952
M.Sc.	Engineering Science	Stanford	1958
Ph.D.	Engineering Economic Systems	Stanford	1968

Academic and Related Experience

Associate Professor of Industrial Engineering at the University of Toronto.

Measurements and Design of Various Engineering Structures 1952-57.

Publications

"The Choice of Parking location by Workers in the Central Business District",
Traffic Quarterly, July, 1969, pp. 397-411.

"The Opportunity, Gravity and Thurstone Models of Individual Choice",
Socio-Economic Planning Sciences, (to be published).

MORTON J.M. POSNER

Professional Interests

Queueing Theory as Applied to Problems in Transportation and Computer
Time Sharing.

Education

B.A.Sc.	Engineering Science	University of Toronto	1963
Ph.D.	Industrial Engineering	University of Toronto	1967

Academic and Related Experience

Assistant Professor, Department of Industrial Engineering, University of
Toronto 1967.

Publications

"Two Stage Closed Queueing Systems with Time Lags", Journal of the Candian
Operational Research Society, 5, 82-99, 1967.

"Closed, Finite Queueing Networks with Time Lags", Journal of the Operations
Research Society of America, 16, pp. 962-976, 1968.

"Closed, Finite Queueing Networks with Time Lags and with Several Classes of
Units", Journal of the Operations Research Society of America, 16, pp 977-985, 1968.

J.G.C. TEMPLETON

Professional Interests

Statistical Models in Economic Planning. Bulk-Arrival and Bulk-Service Queueing Models.

Education

B.A.	Applied Mathematics	University of Toronto	1947
M.A.	Mathematics	Princeton University	1956

Academic and Related Experience

Associate Professor of Industrial Engineering, University of Toronto 1968-.

Mathematician, Ontario Hydro 1956-68.

Publications

D.K.A. Gillies, J.G.C. Templeton and W.H. Winter, "Optimum Safety Stock in a Coal-Ordering Problem", CORS Journal, Vol. 3, March 1965, pp. 29-45.

J.G.C. Templeton, "A Problem Suggested by a Paper by Love", CORS Journal, Vol. 5, No. 1, March 1967, pp. 47-48.

DEPARTMENT OF MECHANICAL ENGINEERING

F.C. HOOPER

Professional Interests

Research interests in heat transfer in boiling and flashing liquids and in conduction in thermal insulation and related problems.

Education

B.A.Sc.	Engineering Physics	University of Toronto	1946
D.I.C.		London	1953

Academic and Related Experience

Professor of Mechanical Engineering, University of Toronto.

Consultant in heat transfer, heat engineering to various industrial and governmental groups.

Publications (Selected)

The Flashing of Liquids at Higher Superheats - with A.H. Abdelmessih - Third International Heat Transfer Conference 1966.

Velocity, Subcooling and Surface Effects in the Departure from Nucleate Boiling of Organic Binaries with Andrews and Butt - The Canadian Journal of Chemical Engineering, Vol. 46, 1968.

Bubble Growth and Pressure Relationships in the Flashing of Superheated Water - with Eidlitz and Faucher, UTME TP 6904 (3 volumes) July 1969.

The Initial Vapor Bubble Growth on a Heated Wall During Nucleate Boiling - with V. Sernas, International Journal of Heat and Mass Transfer (1969).

Pressure Effects on Bubble Growth in the Flashing of Superheated Water - with Faucher and Eidlitz, Prepared for the Fourth International Heat Transfer Conference, Paris, 1970.

PAUL S. SHEN

Professional Interests

Research Interests in Cryogenic Engineering: Steady and unsteady two-phase flow of cryogenic fluid in a pipeline with applications to the transportations of Liquefied Natural Gas through a long pipeline, and of electrical power through a refrigerated low resistance cable.

Education

B.Sc.	Engineering	London
M.Sc.	Thermo	Birmingham
Ph.D.	Engineering	London

Academic and Related Experience

Assistant Professor in Mechanical Engineering, University of Toronto 1968-.

Lecturer in Mechanical Engineering, Battersea College of Advanced Technology 1957-63.

Associate Research Officer, High Speed Aerodynamics Lab. and Low Temperature Lab., National Research Council of Canada, Ottawa 1964-68.

Aerospace Division, Computing Devices of Canada Ltd., Research Scientist, Ottawa 1963-64.

Research and Development Engineer, British Motor Corporation, Birmingham, England 1956-57.

Publications

"Pressure Drop of Two-Phase Flow in a Pipeline with Longitudinal Variations in Heat Flux." by P.S. Shen and Y.W. Jao, presented at the Cryogenic Engineering Conference, University of California, Los Angeles, U.S.A., June 16-18, 1969.

"Pressure Drop of Cryogenic Fluid Flow in a Partly Insulated Pipeline." by P.S. Shen and Y.W. Jao, presented at the International Institute of Refrigeration, The Liege (Belgium) Meeting, September 9-11, 1969.

DEPARTMENT OF PHYSICS

JAMES D. PRENTICE

Education

B.Sc.	McGill University	1951
M.Sc.	McGill University	1953
Ph.D.	University of Glasgow	1960

Academic and Related Experience

Associate Professor, Department of Physics, University of Toronto, 1963-.

Fixed term appointment, Rutherford High Energy Laboratory, 1963-64.

Assistant Professor, University of Toronto, 1958-63.

DEPARTMENT OF POLITICAL ECONOMY

ALAN ABOUCHAR

Professional Interests

- a) Analysis of traffic allocation, transportation investments, and user charges;
- b) Development and application of criteria for decision-making for transportation systems;
- c) External economies of transportation.

Education

B.A.	Economics	New York University	1954
A.M.	Economics	New York University	1960
M.A.	Statistics	University of California, Berkeley	1963
Ph.D.	Economics and planning	University of California, Berkeley	1966

Academic and Related Experience

Associate Professor, Department of Political Economy, University of Toronto.

Research Associate, Institute for the Quantitative Analysis of Social and Economic Policy.

Economics of Transportation, for Engineers and Economists working in the public transport sector, Rio de Janeiro 1967.

The Soviet Economy, University of Maryland 1965.

Economic Statistics, University of California, Berkeley, (teaching assistant) 1962-63.

Associate Research Economist, University of California Mission to the Brazilian Ministry of Planning 1965-68.

Statistician, McKinsey and Co., NYC 1959-60.

Statistician, Industrial Commodity Corp., NYC, 1958-59.

Publication

Plano Decenal de Desenvolvimento Economico e Social - Transportes, EPEA, 1967 (130 pages). (Road and coastal shipping investment plans contributed by others).

Diagnostic of the Transport Situation in Brazil, EPEA, 1967 (139 pages) Sections of this study were excerpted and published in the Revista Ferroviaria, the main Brazilian railroad journal, in January and March 1968.

"Inflation and Transportation Policy in Brazil", Economic Development and Cultural Change, Fall 1969.

Soviet Planning and Spatial Efficiency; the Prewar Cement Industry. To be published by Indiana University Press (180 pages).

"Public Investment Allocation and Pricing Polity", Essays on Brazil H.S. Ellis, ed., UC Press, forthcoming (30 pages).

ALAN R. DOBELL

Education

B.A.		University of British Columbia	1959
M.A.	Mathematics	University of British Columbia	1961
Ph.D.	Economics	Massachusetts Institute of Technology	1965

Academic and Related Experience

Professor of Economics, University of Toronto 1969.

Research Associate, Institute for the Quantitative Analysis of Social and Economic Policy, 1969.

Associate Professor of Mathematics and Economics, University of Toronto 1967-69.

Assistant Professor, Department of Economics, Harvard University 1964-68.

Summer Lecturer, Faculty of Commerce, University of British Columbia, "Topics in Quantitative Analysis" 1962-63.

Teaching Assistant, Department of Mathematics, University of British Columbia 1960-61.

Programmer, University of British Columbia Computing Center, 1958-61.

Consultant, National Energy Board of Canada (Operations Research Branch), and Department of Finance, Ottawa 1958-61.

Publications (Selected)

A.R. Dobell, "Optimization in Models of Economic Growth" invited address delivered at the 1968 National Meetings of the Society for Industrial and Applied Mathematics, Toronto, June 1968, to appear in the Conference Proceedings.

A.R. Dobell, "Review of Connors, M.M., and Teichroew, D., Optimal Control of Dynamic Operations Research Models", a book review to appear in JIEEE Transactions on Automatic Control.

A.R. Dobell, "Review of Kuenne, Robert E., A Microeconomic Theory of the Market Mechanism", American Economic Review, December 1968.

A.R. Dobell, "The CES Production Function: Extensions and Comments (Introduction)", an introductory comment in a symposium edited for the Review of Economics and Statistics, November 1968.

A.R. Dobell, and Y.C. Ho, "Optimal Investment Policy", to appear in Proceedings of a Conference on Mathematical Systems Theory and Mathematical Economics, Varenna, Italy, June 1967 (Springer - Verlag).

A.R. Dobell, "A Stochastic Model of the Unemployment Pool", Harvard Institute for Economic Research Discussion Paper #29, May 1968.

LEONARD WAVERMAN

Professional Interests

- a) Application of Linear Programming to Determine Optimal Flow Paths;
- b) Application of Mixed Integer-Iterative Programming to Determine Optimal Flow and Investment Paths Over Time;
- c) Estimation of Generalized Econometric Demand Functions;
- d) Cost-Benefit Analysis of Alternative Transportation Policies.

Education

B.Com.		University of Toronto	1964
M.A.	Economics	University of Toronto	1965
Ph.D.	Economics	Massachusetts Institute of Technology	1969

Academic and Related Experience

Assistant Professor, Department of Political Economy, University of Toronto, 1969.

Research Associate, Institute for Quantitative Analysis of Social and Economic Policy, University of Toronto 1969.

Economist, Operations Research Branch, National Energy Board, Ottawa 1966.

Economist, Merger and Monopoly Division, Anti-Combines Branch, Department of Justice, Ottawa 1966.

Consultant to government and industry.

Publications

"Sales Revenue Maximization", Journal of Industrial Economics, November 1968.

"Optimal Distribution of North American Natural Gas Flows", unpublished dissertation, M.I.T., 1969. (a linear programming model of North American Natural Gas Flows).

"Pollution, A Problem in Economics," in L. Smith and L. Officer (ed.), Canadian Economic Problems and Policies, (McGraw-Hill, Spring 1970) September 1969.

JOHN W.L. WINDER

Education

B.Comm.	Commerce & Finance	University of Toronto	1954
M.A.	Economics	University of Toronto	1955
Ph.D.	Economics	University of Chicago	1960

Academic and Related Experience

Associate Professor of Economics, University of Toronto, 1962-.

Research Associate, Institute for the Quantitative Analysis of Social and Economic Policy, 1969.

Associate Professor of Economics, Ontario Agricultural College 1958-62.

Consultant for the Royal Commission on Taxation re: pilot study of macro models and estimation of full employment surplus, 1963.

Econometrician for the Royal Commission on Banking and Finance, 1962.

Consultant to Government and Industry.

Publications (Selected)

Marshall, R.G., and Winder, J.W.L., "The Royal Commission on Price Spreads of Food Products: A Review Article:", Canadian Journal of Agricultural Economics, Vo. VLII, No. 2, 1960, pp. 10-19.

Winder, J.W.L., "Is Inflation Inevitable?", Proceedings of the Co-operation and Marketing Conference, January 1960, Ontario Agricultural College, Department of Agric. Economics (18 pages).

Winder, J.W.L., "The Effect of our Exchange Rate on Canadian Agriculture and Industry", Proceedings of the Co-operation and Marketing Conference, January 1961, Ontario Agricultural College, Department of Agric. Economics, pp. 56-68.

Johnson, Harry G., and Winder, J.W.L., Lags in the Effect of Monetary Policy in Canada, Queen's Printer, 1964 (mimeo).

Winder, J.W.L., "Some Policy Implications of Recent Empirical Work", Canadian Economic Policy Since the War, Canadian Trade Committee, Private Planning Association of Canada, Kaliski editor, April 1966, pp. 79-97.

Winder, J.W.L., "Built-in Stability", The Canadian Forum Vol. XLVII, No. 556, May 1967, pp. 30-31.

Winder, J.W.L., "Structural Unemployment", The Canadian Labour Market, Readings in Manpower Economics, Centre for Industrial Relations, University of Toronto, editors Kruger and Meltz, 1968, pp. 135-220.

DEPARTMENT OF SOCIOLOGY

WILLIAM MICHELSON

Professional Interests

- a) Assessment of recent and possible future residential shifts away from the largest cities and to cities of more modest size that could help to make a "corridor;
- b) Determinants of residential location decisions.

Education

A.B.	Princeton University	1961
Ph.D.	Harvard University	1965

Academic and Related Experience

Associate Professor, Department of Sociology, University of Toronto.

Visiting Professor (Summer Session), University of California, Berkeley 1966.

Instructor, Assistant Professor, Princeton University, 1964-66.

Teaching Fellow, Harvard University, 1962-64.

Sociological Consultant: Malvern and Saltfleet New Town Project,
Ontario 1968.

Committee of Examiners for the Graduate Record Examination in Advanced
Sociology, Educational Testing Service, Princeton, New Jersey 1968-.

Consulting Editor, Sociological Inquiry, 1967-.

Planning Intern, Chicago Area Transportation Study, summer 1962.

Publications (Selected)

"An Empirical analysis of Urban Environmental Preferences", Journal of
the American Institute of Planners, Vol. 32, 1966, pp. 355-360.

"Potential Candidates for the Designers' Paradise: A Social Analysis
from a Nationwide Survey", Social Forces, Vol. 46 (1967), pp. 190-196.

"Urban Sociology as an Aid to Urban Physical Development", Journal of the
American Institute of Planners, Vol. 34, (March 1968): 105-108.

"A Parsonian Scheme for the Study of Man and Environment, or What Human
Ecology Left Behind in the Dust", Sociological Inquiry, Vol. 38 (Spring
1968): 197-208.

"Most People Don't Want What Architects Want", Trans-action, Vol. 5
(July/August 1968): 37-43.

Man and His Urban Environment (tentative title), Reading, Massachusetts:
Addison-Wesley, Urban Studies Series (forthcoming in Fall 1969).

"Ecological Thought and Its Application to School Functioning"
(forthcoming publication by the Association for Supervision and
Curriculum Development, National Education Association).

DEPARTMENT OF URBAN AND REGIONAL PLANNING

GERALD HODGE

Professional Interests

- a) The importance of the urban areas to the overall transportation situation.
- b) Transportation demand, network form, relevant modes and needed technology.

Education

B.A.	Sociology and Geography	University of British Columbia	1957
M.C.P.	City and Regional Planning	University of California at Berkeley	1959
Ph.D.	Regional Planning	Massachusetts Institute of Technology (Cambridge, Mass.)	1965

Academic and Related Experience

Associate Professor, Department of Urban and Regional Planning, University of Toronto 1964.

Instructor, Department of City and Regional Planning, Massachusetts Institute of Technology 1961-62.

Instructor, Graduate Course in Community and Regional Planning, University of British Columbia, 1959-61.

Assistant Research Specialist in Regional Planning, Center for Community Studies, University of Saskatchewan 1962-64.

Associate Planner, Adams, Howard, and Greeley, Cambridge, Mass. 1961-62.

Considerable consulting in Urban Development.

Publications (Selected)

"The Rise and Demise of the U.N. Technical Assistance Administration," Canadian Public Administration, 10 (March 1967).

"Branch Line Abandonment: Death Knell for Prairie Communities?" Canadian Journal for Agricultural Economics, Vol. XVI; 1 (1968), 54-70.

"Urban Structure and Regional Development, Papers of the Regional Science Association, Vol. 21, 1968, 101-125.

with Robert McCabe, Land Use Classification and Coding in Canada: an Appraisal, Plan Canada, Journal of the Town Planning Institute of Canada, June 1968, 28 pp.

Comparisons of Structure and Growth of Urban Areas in Canada and the U.S.A., (Toronto: University of Toronto Center for Urban and Community Studies, 1969), Research Paper No. 9.

"Grain, Trains and Towns", Proceedings of Transportation Research Forum, 1968 (forthcoming).

JACQUES D. PARIS

Professional Interests

Methodology for solving design problems - the identification of goals and values in order to develop criteria necessary for guidance in the selection of solutions.

In a framework set-up in such a manner, the evaluation of demand can be clearly defined in terms of nature and volume. The relative urgency to satisfy the various kinds of demand and the degree to which each one must be satisfied contribute to the development of research and development policies.

Education

Institut Catholique des Arts et Metiers, Lille (France) 1953 - 1957,
Diplome d'Ingenieur de l'ICAM 1957.

University of Toronto, Department of Urban and Regional Planning,
Master's Degree in Urban and Regional Planning 1967.

Academic and Related Experience

Lecturer in Urban and Regional Planning, Department of Urban and Regional Planning, University of Toronto 1966-.

Assistant Professor, Faculte de l'Amenagement, Universite de Montreal,
Methodology and Techniques of Research 1969.

Department Assistant (Computer Applications) University of Toronto 1965-66.

Research Studies in Urban and Rural Development Capability for Prince Edward Island, Canada Department of Health and Welfare 1965.

Five years in Industrial Engineering and Management Consulting (System Design) France and Canada 1960-65.

Publications

Gerald Hodge and Jacques Paris, "The System of Central Places of Prince Edward Island", February 1967.

Gerald Hodge and Jacques Paris, "Identifying Parameters of Rural Non-Farm Poverty in Canada", A report prepared under a grant from the Canadian Center for Community Studies and the Canada Department of Health and Welfare, April 1969.

Gerald Hodge and Jacques Paris, "Demographic Factors and Regional Development: Impact on Allocation of Educational Resources in Ontario", A paper prepared for the Conference on Implications of demographic factors for Educational planning and research, Ontario Institute for Studies in Education, Toronto, June 1969.

APPENDIX II

CURRICULA VITARUM FOR YORK

UNIVERSITY STAFF MEMBERS

GERALD A. P. CARROTHERS

Education

Massachusetts Institute of Technology, Ph.D., 1959 (Economics and Regional Planning, minor in Government).
 Harvard University, M.C.P. 1953 (City and Regional Planning).
 University of Manitoba, M Arch. 1951 (Community Planning, minor in Urban Sociology and Political Science).
 University of Manitoba, B. Arch. 1948 (Architecture).
 University Hill School, Vancouver, B. C.

Academic Honours

Centennial Medal (Canada), 1967.
 Canadian Social Science Research Council, Pre-doctoral Fellowship, 1955.
 Harvard University, Junior Fellowship (declined), 1953.
 Royal Architectural Institute of Canada, College of Fellows Scholarship, 1952.
 Isbister Scholarship, University of Manitoba, Architecture, 1946.
 Isbister Scholarship, University of Manitoba, Arts and Science, 1944.

Personal

Born: July 1, 1925, Saskatoon, Saskatchewan
 Married: to Elizabeth Anne French (1958)
 Children: Susan Elizabeth (1959)
 Kathryn JoAnne (1960)
 Sandra Lee (1961)
 Karin Patricia (1963)
 Adam John Fraser (1968)
 General Biographical listing in: American Men of Science

Experience

Dean, Faculty of Environmental Studies, York University, Toronto, 1968-
 Consultant Advisor to Central Mortgage and Housing Corporation, 1968-
 Member, Advisory Group, Central Mortgage and Housing Corporation, Ottawa, 1967-68
 Director, Institute for Environmental Studies, University of Penna., 1965-66
 Chairman, Graduate Group in City Planning, Graduate School of Arts and Sciences, University of Pennsylvania, 1962-66
 Chairman, Department of City and Regional Planning, Graduate School of Fine Arts, University of Pennsylvania, 1961-65
 Associate Professor of City Planning, Graduate School of Fine Arts, University of Pennsylvania, 1960-66
 Various, consultant to: University of West Virginia, United States Public Health Service, Central Mortgage and Housing Corporation, California State Planning Board, Municipality of Metropolitan Winnipeg, Puerto Rico Planning Board, Washington Center for Metropolitan Studies. 1960-66
 Assistant Professor of Urban and Regional Planning, School of Architecture, University of Toronto, 1956-59
 Research Assistant, Department of City and Regional Planning, Massachusetts Institute of Technology, 1953-55
 Research Planner, School of Architecture, University of Manitoba, 1952-53
 Planning consultant to Lethbridge, Alberta, and occasional architectural practice, British Columbia, 1950-53
 Planner, Metropolitan Plan of Greater Winnipeg, Summer 1950

GERALD A. P. CARROTHERS:

Military Service (No Active Service)

Supplementary Reserve, Canadian Army (rank of Captain), 1960-
 2 Field Engineer Regiment, Royal Canadian Engineers (militia) Toronto, 1956-59
 Supplementary Reserve, Canadian Army, 1955-56
 6 Field Engineer Regiment, Royal Canadian Engineers (reserve force), Winnipeg,
 1950-55
 University of Manitoba Contingent, Canadian Officers Training Corps, Canadian Army,
 1944-45
 University Naval Training Division of the University of Manitoba, 1943-44

Publications

Major contributor, Urban and Regional References, Canadian Council on Urban and
 Regional Research, Ottawa, 1964, xiv + 403 pp.
 With Walter Isard, "A Regional Science Approach to Market Projections", in Cox,
 Alderson, and Shapiro, editors, Theory in Marketing, Richard D. Irwin, 1964.
 With Robert B. Mitchell and Jack C. Smith, Regional and Metropolitan Planning in
 Puerto Rico, a report to the Puerto Rico Planning Board, 1963, iv + 12 pp.
 Editor, Papers and Proceedings of the Regional Science Association, Volume 1, 1955
 to Volume 9, 1962 (not including volume 8, 1962).
 With Walter Isard and others, Methods of Regional Analysis: An Introduction to
 Regional Science, Technology Press of M.I.T. and John Wiley and Sons, 1960.
 "Prospects for Urban Renewal in Canada", Habitat, Vol. 3, No. 4, 1960.
 Editor, Plan, the Journal of the Town Planning Institute of Canada, Volume 1,
 Number 1, 1959.
 "Population Projection by Means of Income Potential Models", Papers and Proceedings
 of the Regional Science Association, Volume 4, 1958.
 "Techniques of Coordinated Development", Seminar on Land Use Problems in Ontario,
 Conservation Council of Ontario, 1958.
 "An Historical Review of the Gravity and Potential Concepts of Human Interaction",
Journal of the American Institute of Planners, Vol. 22, No. 2, Spring, 1956.
 "Gravity and Potential Models of Spatial Interaction", Papers and Proceedings of the
 Regional Science Association, Volume 2, 1956.
 Review of Land Uses in American Cities, by Harland Bartholomew, in Journal of the
 American Institute of Planners, Vol. 22, No. 1, Winter 1956.
Planning in Manitoba: A Study of Present Practices and Future Prospects of Community
 Planning in the Province of Manitoba Winnipeg, Government of Manitoba and
 the University of Manitoba, 1956. viii + 149 pp.
 "Community Planning in Manitoba", Fourth Annual Conference Report of the Manitoba
 Urban Association, East Kildonan, 1953.
Survey for Planning - 1951: A Study of Factors Affecting the Growth of Lethbridge,
 Alberta Winnipeg, the University of Manitoba, 1951. xiii + 155 pp.
An Introduction to Accounting for Architects. Winnipeg, the University of Manitoba,
 School of Architecture, second edition, 1951. (proc.)

GERALD A. P. CARROTHERS:

Lecturer and Design Critic, School of Architecture, University of Manitoba, 1948-52
 In office of C.B.K. Van Norman, Architect, Vancouver, B.C., Summers 1946-49
 Part-time Demonstrator in Architectural Drawing and Descriptive Geometry, School
 of Architecture, University of Manitoba, 1944-48

Other Professional and Academic Activities

Member, Council of the Town Planning Institute of Canada, 1968-
 Member, Board of Examiners, American Institute of Planners, 1968-
 Member, Editorial Advisory Board, Journal of the American Institute of Planners, 1968-
 Member, Committee on Continuing Education, American Institute of Planners, 1968-69
 Member, Committee on Planning Schools, American Institute of Planners, 1968-
 Member, Engineering and Urban Health Sciences Study Section, United States Public
 Health Service, 1967-
 CMHC Councillor, Community Planning Association of Canada, 1967-68
 Associate Editor, Journal of Regional Science, 1967-
 Vice-President, Regional Science Association, 1966-67
 Panel of editorial advisors, Demography, 1966-67
 Member, Environmental Sciences Review Committee, United States Public Health Service,
 1966
 Advisor, Appalachian Review, 1965-68
 Vice-President, and Director, Philadelphia Regional Chapter, American Institute of
 Planners, 1961-66
 Vice-President (until 1966), and Director, Regional Science Research Institute, 1960-
 Review Editor, Journal of the American Institute of Planners, 1959-63
 Member, Editorial Advisory Board, Journal of the American Institute of Planners,
 1958-65
 Director, Chairman and Past-Chairman, Central Ontario Chapter, Town Planning Institute
 of Canada, 1956-59
 Editor, Town Planning Institute of Canada, 1956-59
 Editor, Regional Science Association, 1954-63

Memberships

Architectural Institute of British Columbia (1951-54)
 American Institute of Planners (1950)
 American Society of Planning Officials (1950)
 Institute of Professional Town Planners, Ontario (1950-52)
 Urban Land Institute (1950-54)
 Community Planning Association of Canada (1946)
 Royal Architectural Institute of Canada (1951)
 Town Planning Institute of Canada (1952)
 Regional Science Association (Founding member 1954)
 American Economic Association (1956)
 Canadian Political Science Association (1956)
 Population Association (1956)
 Association of American Geographers (1956-58)
 American Sociological Association (1956-62)
 Institute of Public Administration of Canada (1958)
 Ontario Association of Architects (1959)
 Canadian Economic Association (1967)

JAMES CUTT

Education

M.A., Edinburgh, 1960

M.A., Ph.D., Toronto

Experience

Class Assistant, University of Toronto, 1960-62

Instructor, University of Toronto (taught Economics to Engineering students), 1962-63

Lecturer, Economic Development, Econ Theory; Social Sciences, York University, 1963-66

Assistant Professor, Econ. Development; Public Finance; Social Sciences, York

University, 1966-67

Assistant Professor, Public Finance; Mathematics for Economics Students (2 sections);

Social Sciences, York University, 1967-69

Associate Professor, Public Finance, Principles of Economics, Mathematics for Economists,

Social Sciences, York University, 1969-70

Memberships

American Economic Association

Scottish Economic Society

Canadian Economic Association

Publications

Reviews -

W. B. Reddaway, "The Development of the Indian Economy" in the Canadian Journal of Economics and Political Science, Vol. 29, Aug. 1963, pp. 421-422.

G. Rosen, "Democracy and Economic Change in India; accepted by Canadian Journal of Economics and Political Science, Vol. XXXIII, Feb. 1967, pp. 153-155.

S. Chandrasekhar, "American Aid and India's Economic Development", accepted by Canadian Journal of Economics and Political Science, for publication in next issue.

W. A. Johnson, "The Steel Industry of India", accepted by Canadian Journal of Economics and Political Science for publication in next issue.

M. Kidron, "Foreign Investments in India; The International Journal of Comparative Sociology, Vol. 8, Nos. 1 and 2 1967, pp. 270-271.

W. W. Lockwood, (ed.), "The State and Economic Enterprise in Japan", The Journal of Asian and African Studies, Vol. I No. 4, 1967.

Articles -

"The Selective Employment Tax in Britain", The Canadian Tax Journal, Vol. XV, No. 1, Jan.-Feb. 1967, pp. 68-76.

"Tax Administration in India - Mr. Kaldor Revisited", The Indian Economic Journal, June 1967.

"The Indian Union Budget 1967-68", accepted for publication by the Canadian Tax Journal in January, 1968.

"Growth and Equity", published by the Faculty of Administrative Studies, York University, as part of symposium on the Carter Commission.

"Inequalities - Estate and Gift Taxation", The Canadian Forum, May 1967, pp. 37-38.

"A Net Wealth Tax for Canada", The Canadian Tax Journal, June-July, 1969.

Books -

The Guaranteed Income Controversy, Woodsworth Foundation, Toronto, 1968.

Readings in Canadian Public Finance, (with A. J. Robinson), Toronto, Methuen, 1968.

Taxation and Economic Development, New York: Praeger, 1968.

JOHN G. DAY

Education

Law School: Western Reserve University, Cleveland, Ohio (LL.B., 1961)
Academic Honors: Theodore E. Sindell Memorial Award (Fort Law); Robert E. Denison Memorial Award (Municipal Law)
College: Oberlin College, Oberlin, Ohio (A.B. 1958)
Varsity Swimming and Track, Assembly Program Committee, House Treasurer

Personal

Married, no children
Age 32
Excellent health

Experience

Special Counsel, Department of Transportation, Washington, D.C. (May 1968 to Present.
Appointed by Secretary Boyd as Special Counsel for a Congressionally authorized 2-year study of the auto insurance industry and the tort system. Responsible for the development of a study design and the delegation of work to other government agencies, private research firms and the study staff.
Consultant, Department of Transportation, Washington, D.C., October 1967-May 1968.
Adviser to the Assistant Secretary for Policy Development and the Director of the Office of Policy Review on liability and insurance problems affecting all modes of transportation. Drafted, coordinated support for and managed PL. 90-313 (authorizing the automobile insurance study) through the Congress for the Department.
Assistant and Legal Adviser to the Vice-Chairman of the Federal Power Commission, Washington, D.C., May 1965-October 1967.
Principal adviser to the Vice-Chairman on all legal, economic and administrative matters arising before the Commission in the administration of the Natural Gas and Federal Power Act.
Attorney, Office of the General Counsel, Maritime Administration, U.S. Department of Commerce, Washington, D.C., September 1962-May 1965.
Worked with the Assistant General Counsel for Legislation preparing Agency and Departmental position reports and testimony on pending legislation. Much of the time I was on special assignment status for the General Counsel and Maritime Administrator and was responsible for a wide range of legal and administrative problems.
Associate, Day & Berkman, 1748 Standard Building, Cleveland, Ohio, June 1961-September 1962.
Handled Workmen's Compensation claims, general legal research, pleadings.

Part-time -

Legislative Reference Bureau, State House, Columbus, Ohio (1959), drafted legislation and resolutions for members of the Ohio General Assembly; law clerk, Day & Berkman, Cleveland, Ohio (1959-61); Office Manager, Citizens for Kennedy Headquarters, Cleveland, Ohio (1960).

Bar Memberships

Ohio; District of Columbia

JOHN G. DAY:

Publications

Who Owns Water?, limited edition printed and distributed by Western Reserve Law School, 1961 A study of the problems involved in water law reform in the State of Ohio.
"Maritime Wrongful Death and Survival Recovery: The Need for Legislative Reform", 64 Columbia Law Review 648, April 1964.
Chapter XXXVI, "Air and Maritime Transportation Contracts", Williston on Contracts (Jaeger's 3rd Edition).

J. TAIT DAVIS:

Principal Investigator, with R. J. Tennant, Pricing the Environment for Industrial Investment: Recommendations for Community Action, research sponsored by Regional Development Branch, Province of Ontario, 1968-69
Principal Investigator, with R. J. Tennant, Labour Fields and Benefit Transmission, research sponsored by Regional Development Branch, Province of Ontario, 1969-70

Professional Associations

Canadian Association of Geographers
Association of American Geographers
Canadian Association of University Teachers

Fields of Interest

Regional Economic Development
Economic Geography
Urban Living Environments

Publications

An Analysis of the Inter-relationships of Urban Economic Functions, M.A. Thesis, The George Washington University, 1958
Land Use Characteristics in and around the Central Business Districts of Eight American Cities, Ph.D. dissertation, Clark University, 1960
"A Scale for Measuring Impact", Paper presented to the Association of American Geographers, April, 1962
Parkway Impact Study: An Investigation of the Effects of Parkways in the National Capital Region, with David L. Ames, August 28, 1962
"Parkways, Values and Development in the Washington Metropolitan Region", Paper presented to the Highway Research Board, January 1963, published in Research Record No. 16, of National Academy of Science Highway Research Board.
"New Directions in Geography: The Use of Quantitative Methods", Paper presented to Association of American Geographers, September 1963
Contributor to Worldscope Encyclopedia, 1959, 1960, 1961, 1962, 1963, 1964, 1965
"Middle Class Housing in the Central City", Economic Geography, Vol. 41, No. 3, July 1965, pp. 238-251. Reprinted in Appraisal Journal, April 1966, pp. 273-287
Chapters 2 and 3 of Preliminary Analysis for an Economic Development Plan for the Appalachian Region, 1965. Report of Litton Industries to Appalachian Regional Commission. With Charles T. Stewart, Jr., and Allan S. Davis.
Chapters 4, 7, 11, 18 and 19 of Penelec Economic Development Program, Central Economic Development Organization, 1966.
"A Subregional Analysis of Appalachia", Paper presented to 1966 annual meeting of Association of American Geographers, Toronto, August 1966.
"Regional Development and the Private Utility" to Edison Electric Institute, St. Louis, Mo. October, 1967.
"Factors Affecting Variations in Housing Values: Design for a Factorial Experiment", Paper presented at the annual meeting of the Ontario Division, Canadian Association of Geographers, February, 1968.
"Development and Planning Regions for Indonesia: A Conceptual Approach", to Third Seminar of the Inter-University Series on Development Problems of Emerging Nations at York University, 4 April, 1968
"Sources of Variation in Housing Values", accepted for publication in October 1970 issue of Geographical Analysis.
An Introduction to Transportation, to be published by Allyn and Bacon Ltd. (Boston) in 1970.

J. TAIT DAVIS

Education

B.A., Honours Geography, University of Toronto, 1955
 M.A., Geography, The George Washington University, 1958
 Ph.D., Geography (Urban and Economic), Clark University, 1960

Experience

Academic -

Graduate Teaching Assistant, The George Washington University, 1956-58
 Graduate Fellow, Clark University, 1958-59
 Assistant Professor, The George Washington University, 1959-62
 Associate Professor, The George Washington University, 1962-66
 Visiting Professor, The University of Toronto, summer 1962
 Visiting Professor, The University of Toronto, summer 1963
 Chairman, Department of Geography and Regional Science, The George Washington University, 1964-66
 Associate Professor, Department of Geography, York University, 1966-
 Associate Professor, Division of Social Science, York University, 1968-

Professional -

Planning Assistant, Oshawa, Ontario: Analysis of Future demands for public school facilities, recreational areas and preparation of city's first zoning ordinance, 1955-56
 Senior Scientist, Urban Planning Data Systems Project, Maryland National Capital Park and Planning Commission: A Study of Information Requirements and Systems of Organization for Planners, 1961-62
 Director, Parkway Impact Study, National Capital Parks, Department of the Interior; A Study of the Effects of Roadways on Land Values Uses and Development, 1961-62
 Consultant to Booz-Allen Applied Research, Inc., 1962-64
 Senior Scientist, AREA Inc., Arlington, Virginia: Study of Economic Development Potential of four depressed Counties in Southwestern Pennsylvania, 1962-63, 1966-
 Consultant to Checchi and Company, Consulting Economists: Market Analysis and Location Studies, 1962-63
 Consultant to Nelson Associates, New York, 1962-63
 Consultant to State of New York: Study of Population Distribution and Growth and Urbanization over the World, 1963
 Field Supervisor, Texas Instruments, Inc.: Bibliographic compilation of research in various aspects of humid tropical environments, 1964
 Consultant to America-in-Miniature, Inc., 1964-65
 Consultant to Litton Systems, Inc: Forecast of growth rates, employment and income in the Appalachian Region, 1965
 Senior Geographer, Central Economic Development Organization, Inc. Economic Development Plans and Programs for various regions, 1966-67
 Consultant to The Matrix Corporation, Arlington, Virginia, 1966-67
 Consultant to Office of Economic Opportunity, Washington, D.C., 1967
 Senior Geographer, Central Economic Development Organization, Washington, D.C. 1967 (on leave from York University)
 Consultant to Grant Park Ohio Corporation on development of Grant Park new town, Clermont County, 1968-69

IVAN R. FELTHAM:

- "The Extraterritorial Application of Antitrust Law, with special reference to the Canadian Radio Patents Case and the British Columbia Peat Moss Case", 1 U.B.C. Law Rev. 229 (1960).
- "Reciprocal Enforcement of Judgments Act", 1 U.B.C. Law Rev. 229 (1960).
- "The Frustrated Contracts Act", 18 The Advocate 5 (1960).
- "Judicial Research", 3 Canadian Bar Journal 80 (1960)
- "An Introduction to Canadian Business Law", (1957; 1959 - revised). (Material for the B. C. Public Administration Course for Provincial Civil Servants).

Major Unpublished Addresses and Papers

- "A New Tax System for Canada? (Proposals of the Royal Commission on Taxation)", an address to the Chicago Tax Club, May 17, 1967 and to the International and Foreign Law Committee of the Chicago Bar Association, May 31, 1967.
- "Legal and Tax Aspects of Exporting", an address at the Export and Industrial Forum, Ontario Department of Economics and Development, Hamilton, October, 1966.
- "Investing in Canada", a series of lectures at the School of Law, Ohio State University, April, 1964.

IVAN R. FELTHAM:

- Co-chairman, American Management Association Seminar on "Business Opportunities in Canada", New York, October, 1966 and November, 1967.
- Co-chairman, American Management Association Seminar on "The Role of Corporate Counsel in International Operations", New York, January, 1967.
- Director of several conferences 1963-68 at the Osgoode Hall Law School, Toronto on Canadian and International law, trade and investment.
- Member, American Society of International Law.
- Member, British Institute of International and Comparative Law.
- Member, Canadian Association of Comparative Law.
- Member, Canadian Bar Association.
- Member, Canadian Tax Foundation.
- Member, International Law Association, Canadian Branch.
- Member, American Management Association.
- Canadian Association of Comparative Law - acting secretary-treasurer 1962-63; member of executive council 1961-65.
- International Law Association, Canadian Branch: Vancouver Section - member of the executive 1958-61; secretary-treasurer 1960-61; Toronto Section - secretary 1964-65.
- Canadian Bar Association, Ontario Branch - member of the Commercial Law Subsection, 1961-
- Canadian Bar Association, British Columbia Branch: member of the Civil Justice Subsection 1957-61; member of the Commercial Law Subsection 1959-61; Chairman of the Committee on Sale of Goods and Security 1960-61.
- World University Service of Canada - treasurer and member of the National Executive Committee 1961-63.
- United Nations Association in Canada, Vancouver Branch - member of the Executive Committee, 1957-60.
- Faculty Club of the University of British Columbia - Chairman of the Board of Directors 1959-60; member of the Board of Directors 1958-60.

Publications

- "Extraterritorial Application of Antitrust Law - A Survey of the Australian, British, Canadian and Indian Positions", International and Comparative Law of the Commonwealth, Duke University Commonwealth Studies Center, 1968, pp. 130-173.
- "Legal Aspects of Trans-Border Business - A Perspective", International Symposium - Canadian-American Legal and Business Problems, pp. 3-16, published by the School of Law of the University of North Dakota, 1968.
- "Lifting the Corporate Veil", Developments in Company Law, Special Lectures of the Law Society of Upper Canada, 1968, pp. 305-332.
- "Tax Treatment of Foreign Source Income", Proceedings of the Twentieth Tax Conference, Canadian Tax Foundation, November, 1967, pp. 289-299.
- "Foreign Sales, Distribution, Licensing and Joint Venture Agreements", 17 De Paul Law Review 46 - 76 (1967), (Joint authorship with Marcellus R. Meek).
- "Taxation of Foreign Income under the United States Internal Revenue Code", Report of the Royal Commission on Taxation, 1967, Chapter 26, Appendix L, pp. 743-771.
- "Federal Law and a Uniform Act on Security in Personal Property", 9 Canadian Bar Journal 30 (1966) (with Jacob Ziegel).
- "New Developments in Security on Inventory", 15 University of New Brunswick Law Journal 1 (1965).
- Export Practice (contributor and joint editor), 1964.
- Cases and Material on Sale of Goods and Sales Financing, 1962.
- "Retail Instalment Sales Financing - Rights of the Assignee-Endorsee - Identification of the Finance Company with the Dealer to Protect the Buyer" (with Kristine Feltham), 40 Can. Bar Rev. 461 (1962).

IVAN R. FELTHAM

Education

University of British Columbia - Bachelor of Arts, 1953
 University of British Columbia - Bachelor of Laws, 1954
 Rhodes Scholar, 1954
 Oxford University, Oxford, England - Bachelor of Civil Law, 1956
 Hague Academy of International Law - International Law Fund Scholarship for Summer Program, 1959
 University of California, School of Law, Berkeley - Fellowship, Summer Workshop for International Legal Studies, 1961

Experience

Law Practice and Teaching -

Barrister and Solicitor, Ontario and British Columbia, Canada.
 Professor, and Director, Business Law Program, Osgoode Hall Law School of York University, Toronto, 1967-
 Consultant on Canadian Law to Baker & McKenzie; in Toronto, 1963-65; in Chicago, 1965-67.
 Professor and Co-director, Commercial Law Program, Osgoode Hall Law School, Toronto, 1961-65.
 Lecturer and Assistant Professor, Faculty of Law, University of British Columbia, Vancouver, Canada, 1957-61.
 Consulting practice to 1963, Toronto and Vancouver, including counselling in business law, labour arbitration and conciliation.
 Clerkship after LL.B.: Messrs. Jestly, Morrison, Eckardt, Ainsworth & Henson, Vancouver, 1954 and 1956-57.

Teaching and Research - Subjects of Specialization -

Osgoode Hall Law School:

Regulation of Business, Transportation Law and Policy; Canadian and International Business Transactions; Sale of Goods and Sales Financing; Creditors' Rights and Bankruptcy; Agency and Vicarious Liability.

University of British Columbia: Faculty of Law:

Canadian and International Business Transactions; Conflict of Laws; Contract; Legal System.

Faculty of Commerce and Business Administration:

Industrial and Business Law.

Department of Economics and Political Science:

Commercial, Labour, Constitutional and Administrative Law for Provincial Civil Servants.

School of Architecture

Building Contract..

Activities

Chairman, Canadian Bar Association National Committee on Special Act Companies.
 Member, Canadian Bar Association, National Committee on a Uniform Personal Property Security Act.
 Member, Board of Governors of York University.
 Member, Senate of York University.
 Co-chairman, American Management Association Seminar on "Business Law for the Non-Legal Executive", August, 1968.

BIOGRAPHICAL SKETCH

DR. JAMES GILLIES

James Gillies is Dean of the Faculty of Administrative Studies at York University. From 1951 to 1965 he was Professor of Urban Economics in the Graduate School of Business Administration, University of California. For many years he was Dean in charge of the Graduate Programme at the UCLA School of Business, and in that capacity was responsible for the development of one of the largest full-time doctoral programmes in business administration in the United States.

Dr. Gillies was educated at the University of Western Ontario, London, Ontario (B.A. Economics), Brown University, Providence, Rhode Island (M.A. Economics) and Indiana University, Bloomington, Indiana (Ph.D. Economics).

He is the author of several books, numerous scholarly studies and more than 200 articles of a popular nature on business and finance, with special emphasis on the financing of housing. He is currently writing a weekly column on economics and business, which appears every Monday in the Toronto Telegram.

While in California Dr. Gillies served as the Vice-Chairman of the Redevelopment Agency of the City of Los Angeles and acted as adviser to the California Commission on Metropolitan Problems and the Commission on Housing. He was consultant to the Commission on Money and Credit and has been an adviser to the Administrator of the Housing and Home Finance Agency and the Department of Justice in Washington, D.C. He has also advised the Organization of American States with respect to development problems in Latin America. Dr. Gillies has served as a consultant to many local and state governments as well as to hundreds of major industrial organizations. Much of his work with business concerns was conducted in association with the Stanford Research Institute. These various projects and programmes have taken him on many trips throughout Europe and Latin America.

Dr. Gillies has served as a Director of Brentwood Financial Corporation - a financial holding company; Brentwood Savings and Loan Association; S. V. Hunsaker and Sons - a completely owned subsidiary of Occidental Petroleum Corporation and one of the largest home building firms in the United States; O.K. Earl Corporation - developers of industrial complexes; Investors Research Fund - a mutual investment fund; the Shipley-Stewart Corporation - a consulting research company; and the Internation Student Centre. He is currently serving as a Director of Maple Leaf Mills Ltd., Markborough Properties Ltd., Zenith Electric Supply Ltd., the American Real Estate and Urban Economics Association, the Canadian Civil Liberties Association, the Canadian Institute on Public Affairs, the Canadian Council on Urban and Regional Research, and the Institute of Canadian Bankers. He is also a member of the Trade and Commerce Minister's Export Advisory Council.

July, 1968.

RONALD K. HOUSE

Education

B.A. (Hons.), Mount Allison University, 1962.
M.A., 1963, University of Alberta, "Value Judgements in Economic/Welfare Economy".
Ph.D., 1966, London School of Economics, "Some Forms of Non-market Interdependence and their Implications for Economics Efficiency and Public Policy".

Academic Honours

Mount Allison University Scholarship
Mount Allison University Student Assistantship
Open Scholarship, University of Alberta
Howard S. Simpson Prize in Economics
The Francis Reeve Interum Scholarship
School Scholar, London School of Economics
London School of Economics, Levelhulme Scholarship

Areas of Interest

Micro-economic Theory

Experience

Member of the Expert Technical Committee to Review Order #123994 (Board of Transport Commissioner Order to Implement National Transport Act).
Director of the 1967 Ontario Survey of Dental Profession (for the Royal College of Dental Surgeons and the Institute of Behavioural Research, York University).
Member of Council, Corporation of the Township of Caledon.
Member of Dental Sub-committee, Ontario Council of Health.
Member of the Joint Planning Committee, Orangeville and Area.
Member of the Planning Board, Corporation of the Township of Caledon.
Economic Consultant to the Canadian Trucking Association.

Publications

Dentistry in Ontario (now in proof) to be published November 1969.
Various newspaper articles.

Current Research

Cost Functions in the Canadian Trucking Industry: A Theoretical and Econometric Study.
Separability and the Partitioning of Utility
Sub-optimization and the General Theory of Second Best.

WILLIAM A. JORDAN

Education

Ph.D., U.C.L.A.
M.S., Columbia
B.S., Antioch

Personal

Born September 10, 1928
Married, with no children
Date of Appointment: July 1, 1967
Present Position: Associate Professor, Faculty of Administrative Studies, York University, Economics Area Coordinator

Experience

Acting Assistant Professor of Business Economics and Transportation, Graduate School of Business, Stanford University, January 1966 to June 1967.
Economist, Research Department, Western Air Lines, Inc., May 1960 to September 1964.
Assistant to the Director of Research, The Transportation Center at Northwestern University, December 1958 to April 1960. Research in airline, merchant marine, and military transportation economics.
Research Assistant, Columbia University, June 1957 to November 1958. Participated in the preparation of: The Ineffective Soldier, Lessons for Management and the Nation, by Eli Ginzberg and Associates; and Regulation and Competition in Air Transportation, by Samuel B. Richmond.
Air Route Analyst, James C. Buckley, Inc., terminal and transportation consultants, June 1955 to May 1957.
Sales Representative, Seaboard and Western Airlines, Inc., April to September 1954.
Cargo Sales Representative, Air France, October 1953 to April 1954.
Special Assistant to the Cargo Traffic Manager, Assistant Airport Cargo Supervisor, Cargo Agent, Scandinavian Airlines System, Inc., December 1947 to August 1951.

Military -

U. S. Air Force Reserves, service from August 1955. Present rank and assignment: Major, Procurement Management Staff Officer, DCS Material, Headquarters, Military Airlift Command.
U. S. Marine Corps, active duty from August 1951 to August 1953. Highest rank and assignment: Staff Sergeant, Instructor, Radio Repairman's School.

Advisory -

Member, ASA Advisory Committee for Statistical Research to the Civil Aeronautics Board. Executive Committee, York Transport Centre. National Editorial Board, Cost and Management.

Honours & Memberships

Ford Foundation Doctoral Fellow (1964-66), Seaboard and Western Fellow (1954-55), Beta Gamma Sigma. American Economic Association, American Statistical Association, Western Economic Association, Transportation Research Forum.

WILLIAM A. JORDAN:

Publications

Economic Effects of Airline Regulation, Baltimore: Johns Hopkins Press, 1970
(forthcoming)

"Competition -- A Two-edged Sword in Improving Air Transportation Performance?"
in J. De S. Coutinho, Chm., Transportation a Service. New York: New York
Academy of Sciences, 1967, pp. 153-168.

Current Research

Impact of CAB Regulation on Military Procurement of Commercial Airlift.

TILLO E. KUHN

Education:

B Sc. (Econ.), Honours, London School of Economics and Political Science, 1953
 Graduate Studies at the London School of Economics and at McGill University,
 Montreal, 1953-57
 Ph.D. in Economics, McGill University, 1957

Academic Honours

Lord Rosebery First Prize, London University, 1953
 Bronfman Fellow in Economics, McGill University, 1957

Personal

Born November 1, 1919, Munich, Germany
 Married with four children
 Canadian citizen
 Appointment date: July 1, 1966
 Present Position: Professor, Department of Economics and Faculty of Administrative
 Studies, York University. Fellow of Founders College, York University.

Experience

Economist, Canadian Good Roads Association, Ottawa, 1954-56
 Economist, Government of Canada, Ottawa, 1957-59
 On the faculty of the University of California, Berkeley. Final rank: Associate
 Professor, 1959-65
 Senior Staff, The Brookings Institution, Washington, D.C., (on leave from University
 of California, Berkeley), 1963-64
 Visiting Professor (University of California and Ford Foundation), Center of
 Planning and Economic Research, Athens, Greece, 1964-65
 OECD Senior Consultant and Adviser to the State Planning Organization, Government of
 Turkey, Ankara, 1965-66
 Member, Advisory Council on Research, Department of Transport and Canadian Transport
 Commission, Government of Canada, 1968-
 Director, York University, Transport Centre, 1969-
 Director of International Programmes, York University, 1969-

Consulting and Advisory Activities

Consulting assignments and reports for Canadian Trucking Associations, Ottawa; The
 Automotive Transport Association of Ontario, Inc., Toronto; Ontario Department
 of Highways, Canadian Federation of Mayors and Municipalities; and Canadian
 air carriers, 1954-59
 Department of Highways, Government of Ontario; economic adviser, preparation of
 long-range highway plans and financial analyses, 1961.
 Senior Economist, Stanford Research Institute: economic development and highway
 planning for Republic of Honduras, Central America, for International Development
 Association, IBRD, 1962-63.
 Adviser on metropolitan planning and transport problems to Committee on Economic
 Development (CED), New York, 1963-64.
 Director, Greek National Transportation Study, Center of Planning and Economic Research,
 and Ministry of Coordination, Government of Greece, Athens, 1964-65.
 Special research and advisory assignments for Minister of Transport and Communications,
 Minister of Public Works, Minister of Coordination, Government of Greece, Athens,
 1964-65.
 Participated in preparation of Five-Year Social and Economic Development Plan for
 Greece, 1966-70, 1964-65.

TILLO E. KUHN:

Adviser to the United Nations, Center for Industrial Development, for Inter-Regional Symposium on Industrial Project Evaluation, Prague, CSSR, October, 1965.
 OECD Senior Consultant to State Planning Organization, Government of Turkey, Ankara, 1965-66.
 Senior Economic Adviser, Government of Israel, The Ayalon Project, Tel-Aviv, Israel, 1966-68.
 Staff Consultant, N.D. Les & Associates, and General Engineering Company of Canada (GECO), Toronto, Montreal and Vancouver, 1966-
 Project Director, Projet d'Etude des Transports Terrestres au Dahomey, United Nations Development Programme and International Bank for Reconstruction and Development, 1967-
 Adviser, Canadian Federation of Mayors and Municipalities, First Canadian Urban Transportation Conference, 1968-
 Adviser, Paraguay Highways Project, carried out by De Leuw, Cather and Company of Canada Ltd., for the Government of the Republic of Paraguay; the External Aid Office, Government of Canada; and the Inter-American Development Bank, Washington, D.C., 1968-
 Adviser, Jamaica Transport Survey, carried out by Lamarre, Valois International Ltee., Montreal, for Government of Jamaica and Canadian International Development Agency, 1968-
 Adviser to the Canadian International Development Agency, Member of the Task Force on the International Development Research Centre, 1968-
 Adviser, Urban Transport Efficiency Study, carried out for the Department of Transport, Government of Canada, 1969
 World Bank adviser to the East African Community (Kenya, Tanzania, Uganda).

Publications

Public Enterprise Economics and Transport Problems, University of California Press, Berkeley, 1962.
 "Urban Traffic and Transportation", chapter in Submission to Royal Commission on Canada's Economic Prospects, Canadian Federation of Mayors and Municipalities, Montreal, 1956.
 "Roads, in Canada", Encyclopedia Canadiana, Grolier Society, 1958, (co-author).
 "Use of Economic Criteria for Highway Investment Planning", Highway Investment and Financing, Bulletin 222, Highway Research Board, National Academy of Sciences, National Research Council, Washington, D.C., 1959.
 "Roads to Resources in the Canadian North", Road International, International Road Federation, New York, London, Paris, Spring 1960.
 "Economic Concepts of Highway Planning", Studies in Highway Engineering Economy, Bulletin 306, Highway Research Board, National Academy of Sciences, National Research Council, Washington, D.C. 1961.
Economic Considerations in the Geographic Distribution of Highway User Tax Revenues, Research Report No. 33, The Institute of Transportation and Traffic Engineering, University of California, Berkeley, 1962 (co-author).
Public Enterprises, Project Planning and Economic Development, published by Central Bank of Honduras, Tegucigalpa, 1962, in English and Spanish.
A Ten Year Highway Program for Honduras, report prepared by Stanford Research Institute for the Republic of Honduras, Ministry of Public Works, and the International Development Associations, IBRD, Menlo Park, California, and Tegucigalpa, Honduras, 1963 (co-author and consultant).
Economic Analyses for Selecting Metropolitan Transportation Programs, Research Memorandum prepared for the Committee on Economic Development (CED), Urban Transportation Subcommittee, New York, 1963.

TILLO E. KUHN:

- Economic Analyses for Highway Improvements in Developing Countries, Ninth Pan American Highway Congress, Organization of American States, Washington, D.C., 1963, (co-author).
- Economic Development and Transport Investment Planning: A Case Study in Honduras, Ninth Pan American Highway Congress, Organization of American States, Washington, D.C., 1963, (co-author).
- Developing Metropolitan Transportation Policies: A Guide for Local Leadership, Statement by the Research and Policy Committee of the Committee for Economic Development (CED), New York, 1965, (co-author).
- "The Economics of Transportation Planning in Urban Areas", Transportation Economics: A Conference of the Universities - National Bureau Committee for Economic Research. Columbia University Press, New York and London, 1965.
- Evaluation of Industrial and Infrastructure Projects: Methodology and Practical Experience, paper presented at the Inter-Regional Symposium of Industrial Project Evaluation of the United Nations, Center for Industrial Development, Prague, CSSR, October, 1965.
- "Projects, Plans and Investment Decisions: The Economist's Contributions", in Economic Analysis and Economic Policy (Pan Yotopoulos, editor), Center of Planning and Economic Research, Athens, Greece, 1966.
- "Les Transports en Grece: Situation Presente et Perspectives d'Avenir", Revue du Marche Commun, no. 91, (co-author).
- Summary Description of a Proposed Modern Highway Planning Methodology, Republic of Turkey, Prime Ministry, State Planning Organization, Ankara, June 1966. (With Mahir Barutcu).
- The Ayalon Project: Feasibility Study and Engineering Report, prepared for Netivey Ayalon Limited and Government of Israel, Tel-Aviv and Montreal, March, 1968. (co-author and senior economic adviser).
- Dahomey Land Transport Study: International Traffic. Technical Memorandum No. 6, United Nations Development Programme and International Bank for Reconstruction and Development, February 1968 (with Peter Martin).
- Transport Planning for Social and Economic Development in Dahomey, West Africa, paper presented at the Second Annual Meeting, Canadian Economics Association, Calgary, Alberta, June 1968.
- Dahomey Land Transport, report to the Republic of Dahomey, the United Nations Development Programme, and the International Bank for Reconstruction and Development, prepared by N. D. Lea and Associates and Lamarre Valois International Limitee, Canada, 1968 (project director and co-author).
- Engineering Economic Systems Analysis for Transport Planning in Dahomey, West Africa, Highway Research Board, National Research Council, National Academy of Sciences, Washington, D.C., 1969 (in press) (co-author with Norman D. Lea).
- Republic of Paraguay, Paraguay Highways Project: Feasibility Study for the Trans Chaco Highway and the Access Road from Asuncion to the Trans Chaco Highway and the Bridge over the Paraguay River, Report prepared for the Government of Paraguay, the Inter-America Development Bank and the Canadian International Development Agency, by De Leuw, Cather & Co. of Canada Ltd., Ottawa, Canada, and Asuncion, Paraguay, 1969.
- Government of Jamaica, Jamaica Transport Survey, Carried out for the Government of Jamaica and the Canadian International Development Agency, by Lamarre Valois International Limitee, Montreal, Canada, and Kingston, Jamaica, 1969.
- East African Community, Reviews of the Economist Intelligence Unit's Draft Report, East African Transport Study, London, January 1969 (9 volumes), prepared by Tillo E. Kuhn, Nicodemus Onyango, Michael Sapir and others, for the East African Community, Communications Council; the Governments of Kenya, Tanzania, and Uganda; and the International Bank for Reconstruction and Development; Arusha, Tanzania, 1969.

TILLO E. KUHN:

"New Approaches to Transport Research and Planning", Proceedings of the Colloquium Series on Transportation, 1968-69, Vol. 2, August 1969, Center for Transportation Studies, University of Manitoba, Winnipeg.

Transport and Communications Systems Planning for Reconstruction and Development, Report presented to the Conference on National Reconstruction and Development in Nigeria, Federal Ministry of Economic Development, Lagos, and the Nigerian Institute of Social and Economic Research, University of Ibadan, Nigeria, March, 1969.

Social Indicators. Explorations on Methodology and Measurement, research report for the Bureau of Research, Faculty of Administrative Studies, York University (in progress).

Public Lectures and Special University Seminars

Public lectures and special seminars at the following:

Banco Central de Honduras, Tegucigalpa; University of California, Berkeley; Stanford University; National Council of Applied Economic Research, New Delhi, India; Asian Institute for Economic Development and Planning of the United Nations, Bangkok, Thailand; Center of Planning and Economic Research, Athens, Greece; Athens Technological Institute and Graduate School of Economics, Athens, Greece; Middle Eastern Technical University, Ankara, Turkey; International Bank for Reconstruction and Development; and University of Ibadan; Atlantic Professional Engineers Conference, St. Andrews, New Brunswick; Center for Transportation Studies, The University of Manitoba.

Professional Societies

Canadian Economics Association
American Economic Association
Institute of Transport, London
Canadian Transportation Research Forum

Languages

Fluent in English and German
Good knowledge of French and Spanish

NEIL M. McARTHUR

Education

B.A. General, University of Western Ontario, 1948
 B.A. Honours Geography, University of Western Ontario, 1949
 M.A. Geography, University of Western Ontario, 1950
 Ph.D. Geography, University of Michigan, 1955

Personal

Born London, Ontario; January 1, 1921
 Married, two sons, one 14 and one 16
 Present Position: Associate Professor of Geography, Atkinson College, York University

Experience

Military -

R.C.A.F. and R.A.F. May 1940 to September 1945.
 Originally wireless operator - air gunner and later remustered to pilot.

Academic -

Instructor and Assistant Professor, Michigan State Normal College (now Eastern Michigan University), Ypsilanti, 1951-57.
 Assistant Professor, University of Maryland, 1957-61.
 Assistant and Associate Professor, Royal Military College of Canada, 1961-68.
 Summer of 1961, Summer Institute on Quantitative Techniques, Northwestern University
 July 1968, Associate Professor of Geography, Atkinson College, York University
 In addition I have taught summer school courses at Central Michigan College, University of Western Ontario and Queens University.

Specialities

At Michigan State Normal College I taught a variety of undergraduate courses. At the University of Maryland I was able to develop my land-use geography specialty which was the theme of my M.A. and Ph.D. research. In addition I taught some of the political geography. Since coming to R.M.C. my courses include both general and political-military geography, but my private research has been largely in the realm of land use and particularly dealing with citing and utilization of airport lands.

Publications

Sas, Anthony, and McArthur, Neil, Workbook in Economic Geography, Wm. C. Brown and Co., Dubuque, 1960.
 Downs, John F., Geography and Planning in the Urban Community, edited by Franklin Burdette and Neil M. Arthur, Bureau of Governmental Research, University of Maryland, 1961.
Airport and Community, The Queen's Printer, Ottawa, 1966.
 "The Spread and Migration of French Canadians", Tijdschrift voor Economische en Sociale Geografie, June, 1961.
 "Community Airports in Southern Ontario", Wings in Space, October, 1963.
 "Let's Really Promote Local Airports", Canadian Flight, December, 1964.
 "Recreational Potential in Eastern Ontario", Case Studies in Economic Geography, edited by R. Thoman and D. Patton, McGraw-Hill, 1964.

NEIL M. McARTHUR:

"St. Lawrence Frontier", Kingston Whig Standard and other' Newspapers, January, 1965.
 "The Canadian Military Colleges", Canadian Geographical Journal, September, 1968.

Addresses

"A Community Service Approach to Land-Use Analysis", A.A.G., Pittsburgh, 1958.
 "The French Canadian Population Explosion", Mid-Atlantic Division, A.A.G., 1961.
 "Lakeland, Maryland, A Setting for Grass Roots Redevelopment", A.A.G., East Lansing, 1961.
 "Local Airports", Aeronautics and Space Institute, 1963.
 "The Air Cargo Marshalling Yard: The Next Phase in Air Cargo Transfer?", Southern Ontario Division, C.A.G., 1967.
 "Local Airports in Southern Ontario", C.A.G., London, 1964.
 "The Air Cargo Marshalling Yard:", Association of American Geographers, Washington, 1968.
 Numerous addresses given to local organizations on aviation subjects, land-use planning, and geopolitics.

Research Unpublished

Report on retail groceries of Metropolitan Washington for the Kroger Company, 1960.
 Report on retail groceries of Metropolitan Baltimore for the Kroger Company, 1961.
 Several case studies of Canadian local airports for Department of Transport, 1963-65.
 Feasibility Study of the Proposal to Develop Gander, Newfoundland, as a Major Air Cargo Staging Point, 1967. Prepared for the Atlantic Development Board.
 Chatham-Kent County Regional Airport Study.

Book in Preparation

A Geography of General Aviation (tentative title)

Memberships

Canadian Association of Geographers
 Association of American Geographers
 Greater Cataraqui Conservation Authority (Conservation Areas) (Little Cataraqui Special Advisory Committee)

Awards

Ontario Research Foundation grant - 1950
 U. S. National Science grant - 1961
 Social Science Research grant - 1963
 Department of Transport Research grant - 1964
 Social Science Research grant - 1966

Graduate Instruction

Urban Geography and Transportation, University of Maryland, 1957-61.

GRAEME H. McKECHNIE

Education

B. Comm., University of Toronto, 1961.
 M.Sc., University of Wisconsin, 1963, "Geographic Mobility of Wisconsin Workers".
 Ph.D., University of Wisconsin, 1966, "Retraining and Geographic Mobility: An Evaluation".

Personal

Age 30

Fields of Speciality: Labour Economics, Manpower Resources, Labour Relations, Labour Legislation and Social Security.

Present Position: Assistant Professor, Department of Economics, Faculty of Arts and Science and Faculty of Administrative Studies, York University.

Experience

Research Assistant in Economics under Professor Gerald G. Somers, Wisconsin State Employment Service grant to study Geographic Mobility of Wisconsin Workers, 1961-62.

Research Assistant in Economics under Professor Gerald G. Somers, Ford Foundation Grant to study Retraining of West Virginia Workers, 1962-65.

Teaching Assistant in Economics of the Labor Market, September 1963 to February 1964.
 Grader in Labor Legislation and Social Security, February to June 1963, and February to June 1964.

Project Associate associated with Professor Gerald G. Somers on a study entitled Employment Effects of Plant Expansion and Accelerated Public Works in Rural Redevelopment Areas, supported by a grant from the U.S. Department of Commerce. Research still in process.

Project Associate with Professor Gerald G. Somers studying Research Project to Evaluate the Effectiveness of Relocation Assistance for Workers in Supply Areas Moving to Demand Areas in Wisconsin, under a grant from the Office of Manpower Policy, Evaluation and Research. Research still in process.

Project Associate with Professor Gerald G. Somers studying The Geographic Mobility of Older Workers Displaced in a Plant Shutdown, under a grant from Office of Manpower Policy, Evaluation and Research. Research still in process.

Project Associate, Center for Studies of Vocational and Technical Education, Industrial Relations Research Institute, University of Wisconsin, 1965-67.

Lecturer - Human Relations for Engineers, University of Wisconsin, 1967.

Professional Memberships

American Economic Association, Vice-President, Wisconsin Chapter, IRRA, 1966-67.
 Industrial Relations Research Association (national); Secretary-Treasurer, Wisconsin Chapter, 1964-65, 1965-66.

Publications

"The Older Worker and Retraining - a Survey of MDTA Experience". Paper presented at The National Conference on Manpower Training and the Older Worker, sponsored by the National Council on the Aging, Washington, D.C. 17-19 January, 1966, published in the conference proceedings.

Retraining and Migration as Factors in Economic Development. A Monograph prepared for the Office of Regional Economic Development, September 1966, co-author.

GRAEME H. McKECHNIE:

"Vocational Retraining Programs for the Unemployed" co-author G.G. Somers, University of Wisconsin, Paper presented at the IRRA Meeting, Washington, D.C., 1967.

In Process: Geographic Mobility of Wisconsin Workers, Gerald G. Somers (with Archie Kleingartner, Graeme H. McKechnie, and Collette Moser, Research Assistants). To be published by the University of Wisconsin Press.

The Training and Placement of Older Workers: An Evaluation of Four Community Projects, co-author. Monograph prepared for the National Council on the Aging, Fall, 1967.

Book reviews in various journals.

Current Research Activities

A Study of Labour Relations in the Canadian Trucking Industry sponsored by the Task Force on Labour Relations. The Study of Labour Relations in the Canadian Trucking Industry is completed. Publication plans cannot be implemented until the full Task Force Report is issued and the study is released by the Government.

Manpower Projections in the Canadian Transportation Industry sponsored by the Vice-President's Committee on Canadian Transportation Studies.

A Preliminary Benefit-Cost Study of the Vocational Rehabilitation Program sponsored by the Department of Manpower and Immigration.

Development of a Project Proposal for the Toronto Labour Market Project, A Feasibility Study, under a grant from the Department of Manpower and Immigration.

A Study of Adult Occupational Training Structures in Canada with emphasis on Ontario.

Discussion paper for the North American Conference on Cost-Benefit Analysis and Manpower Policies, held in May 1966 in Madison, Wisconsin. Published in Conference Proceedings - due Fall, 1969.

Graduate Teaching Experience

Taught Graduate Courses, York University, M.B.A. Programme.

ALEXANDER L. MURRAY

Education

B.A., McMaster, 1953
 M.A., Kings College, University of London, 1956
 Ph.D., University of Pennsylvania, 1960

In my Ph.D. studies and for the first three years of teaching, my research was in the area of Anglo-American, social, religious and intellectual history. During this time, I published four articles on social history in Ontario History, The Journal of Negro History, The American Quarterly and the Canadian Historical Review.

Experience

University of Alberta, 1959-62
 York University, 1962-69
 University of Toronto, 1967-69
 Presently teaching:
 History 312 - The Historical Study of the City
 Social Science 371 - The Development of the Modern City
 (University of Toronto) History of Environmental Design

Relevant Publications

"The Alienated Intellectual", Tamarack Review, Summer 1964, 96-102.
 "Planning for People", Proceedings of the 7th Annual Conference of the Niagara Regional Development Association, 1963, pp. 45-50.
 "Frederick Law Olmsted and the Design of Mount Royal Park", Journal of the Society of Architectural Historians, XXV, No. 4, December 1966, pp. 196-209.
 "The Role of an Elite in the Philadelphia Renaissance", Proceedings of the 35th Couchiching Conference, Great Societies and Quiet Revolutions, Canadian Institute on Public Affairs, 1966, pp. 44-51, Toronto 1967.
 "Toronto Through the Looking Glass", Habitat, No. 1, X, Ottawa, Jan.-Feb. 1967, pp. 48-53.
 Introduction to Frederick Law Olmsted, Walks and Talks of an American Farmer in England, (originally published in 1852) University of Michigan Press, 1967.
Housing the Canadian Student - to be published by Association of Universities and Colleges of Canada in November, 1969.

Relevant Papers read

"The Development of the Metropolis", opening lecture in the University of Toronto Extension Department series on the Modern Metropolis, October, 1965.
 "The City, Traditional Values and Contemporary Planning", The Current Events Club, Toronto, February 1965.
 "Regional Planning and Regional Government in Ontario", Annual Meeting of the Ontario Electrical Associations, February 28, 1966.
 "The Growth of Dutch Towns in the 16th and 17th Centuries", 2 lectures to the School of Architecture, Nova Scotia Technical College, October, 1966.
 "The City - Man's Choice or Man's Fate", first of a series on The City of the Future, for the University of Toronto, Division of Extension, January, 1969.

Visiting Lecturer and Critic

University of Toronto, M.A. in Architecture programme, second term, 1964-65; M.A. in Town and Regional Planning, February 1966.

ALEXANDER L. MURRAY:

History of Landscape Architecture and Environmental Design in Department of
Landscape Architecture, 1967-68, 1968-69.
Nova Scotia Technical College, Halifax, School of Architecture, October 1966.

Other Items

Has appeared on television and radio several times in the past few years. e.g.:
 CBC TV series on metropolitan problems, Autumn, 1964
 CTV 2-hour series on the Goldenberg Report and Metro Toronto, Spring 1966
 CBC Radio, "The Learning Stage", Autumn 1965
 CTV Report on Stratford Seminar on Civic Design, July 1966
 CBC Radio, Interviewed on Don Simm's Show, December 2, 1966
 CTV University of the Air, programme on housing, April, 1968
 CBC Radio, Open Line Programme on Regional Government, December 1965
 On over 20 occasions has given a short lecture or participated in a panel discussion
 on urban design, city planning or architecture at various public meetings from
 womens' groups, through service clubs to professional bodies such as the Town
 Planning Institute of Canada.
 Invited to the Canadian Conference on the Arts in camera Seminar, 1966.
 Member of an advisory Committee to plan the Art Gallery of Ontario's centennial
 exhibition "This City Now", for February 1967. Other members include Robert
 Fulford, Ian MacLennan, Vincent Tevell, Arnold Rockman, Vincent Ponti, John
 C. Parkin.
 Chairman of Workshop on "The Preservation of Buildings of Historical and Architec-
 tural Importance", Stratford Seminar on Civic Design, July 1966.
 Programme Chairman of three conferences on "Planning: Problems and Progress", in
 1965, 1966 and 1969, sponsored by the Ontario Division of the Community
 Planning Association of Canada.
 Chairman, Toronto Region Branch of the Community Planning Association of Canada.
 Short Address and Panel discussion with Edward Fiset, Chief Architect of Expo '67
 on the implications of Expo for town planning, Canadian Municipal Equipment
 Show, Toronto, December 1967.
 Member of the Advisory Panel to the Housing Committee of the Canadian Welfare
 Council.
 Consultant to a study team headed by Elein and Sears, Architects commissioned to
 write a report on student housing. (to be published by the University of
 Toronto Press in August, 1969).
 Member of York University Campus Planning Advisory Committee 1963-65, 1967-69.
 Consultant to Student Housing Consultants Ltd in the preparation of a housing study
 for Guelph University, summer, 1969.
 Consultant to Greenwin Property Management Co. regarding the preparation of a report
 on the viability of establishing a social science research division, spring and
 summer, 1969.
 Principal investigator of a CMHC sponsored study, "Housing and Human Behavior", a
 case study of a mixed public and private housing project in Metropolitan
 Toronto, research in progress.

ANDREAS G. PAPANDREOUI. BIOGRAPHYPersonal Data

Born in Chios, on February 5, 1919, Greece

Married, 1951, four children

Education

M.A. in Economics, Harvard, 1942

Ph.D. in Economics, Harvard, 1943

Principal Positions

Teaching Fellow and Tutor, Harvard,	1942-1943
Instructor, Harvard,	1943-1944, 1946-1947
Associate Professor, University of Minnesota,	1947-1950
Associate Professor, Northwestern University,	1950-1951
Professor, University of Minnesota,	1951-1955
Professor, University of California,	1955-1964
(Chairman, Department of Economics, 1956-59)	
Director, Center of Economic Research,	1961-1964
Minister to the Prime Minister and Deputy, Greek Gov't.,	1964
Minister of Coordination, Greek Government,	1965
Deputy, Greek Parliament,	1964-1967
Chairman of PAK, (Panhellenic Liberation Movement),	1968-
Spokesman Abroad, Center Union Party,	1968-
Professor of Economics, University of Stockholm,	1968-1969
Professor of Economics, York University,	1969-

Professional Appointments

Technical Advisor, Greek Delegation, United Nations
Financial and Monetary Conference, Woods, New Hampshire, 1944.

Member of Laboratory for Research in Social Relations,
University of Minnesota, 1949-1950, 1951-1955.

Member of Social Science Research Council Committee on
Research on Business Enterprise, 1954-1955.

Consultant to Anti-Trust Division, Department of Justice,
U.S.A., 1957.

Economic Advisor, Bank of Greece, 1961-1962.

National Research Council, 1963.

Behavioural Sciences Division.

Membership in Scholarly and Professional Organizations

American Economic Association

Royal Economic Society

Econometric Society

Fellowships, Scholarships, Honors and Awards

Faculty Research Fellow, (SSRC), 1952-1955

Fulbright Fellow, 1959-60

Guggenheim Fellow, 1959-1960

Wicksell Lecturership, Stockholm, October 1966.

II. BIBLIOGRAPHYBooks:

An Introduction to Social Science: Personality, Work, Community.
(With A. Naftalin, B. Nelson, M. Sibley, D. Calhoun): Lippincott
1953. Revised editions in 1957 and 1961).

Competition and Its Regulation (with J.T. Wheeler),
Prentice-Hall, 1954.

Economics as a Science: Lippincott, 1958
(Greek Translation by A.A. Lasaris - Graduate School of Industrial
Studies, 1960).

(Spanish Translation: La Economia come Siencia, by J.R.
Lasuen and M. Sacristan - Ediciones Ariel, 1961).

(Italian Annotated Translation: L'Economia come Scienza,
by Mario Arcelli - L'Industria, 1962).

A Strategy for Greek Economic Development, Center of Economic
Research, Athens 1962.

Fundamentals of Model Construction in Macroeconomics,
Center of Economic Research, Athens, 1962.

Introduction to Macroeconomic Models, Center of Economic Research,
Athens, 1965.

(Italian Annotated Translation, 1967)

Democracy and National Renaissance (Athens: Fexis, 1966)

Monographs:

A Test of a Stochastic Theory of Choice, University of California, Publications in Economics, Vol. 16, No. 1, pp. 1-18, University of California Press, 1957.

The Course of Economic Thought, Graduate School of Industrial Studies, Athens, 1960.

Planning Resource Allocation for Economic Development, Center of Economic Research, Athens, 1962.

The Political Element in Economic Development, Wicksell Lectures, Stockholm, 1966.

Contributions to Books:

"Some Basic Problems in the Theory of the Firm", Vol. II of Survey of Contemporary Economics. (Ed. by B.F. Haley). Irwin 1952.

"An Experimental Test of a Proposition in the Theory of Choice", "Consumer Behavior", New York University Press, 1954.

Linear Programming: A New Tool for National Decision, "Linear Economics", Graduate School of Industrial Studies, Athens, 1960, pp. 157-176.

"Agenda for a Policy on Economic Development", Linear Economics, Graduate School of Industrial Studies, Athens, 1960, pp. 230-239.

Articles:

"Market Structure and Monopoly Power," American Economic Review, September 1949.

"Economics and the Social Sciences", Economic Journal, December 1950.

"Types of Empirical Relevance in Modern Economics", Economia Internazionale, May 1952.

"Testing Assumptions Underlying Economic Predictions", (with O.H. Brownlee), Business News Notes (University of Minnesota), May 1954.

"Concentration and Public Policy", Iowa Business Digest, February 1956.

"The Economic Effect of Trademarks", (this article is part of a symposium on Trademarks and Trade Names). Reprinted from California Law Review, Vol. 44, July 1956, No. 3, pp. 503-510.

"Explanation and Prediction in Economics", Science, 24 April, 1959.

Articles: (continued)

"Risk", Encyclopaedia Britannica, 1959

"Macroeconomic Models and Economic Policy", Archive of Economic and Social Sciences, Vol. 39, Oct. - Dec. 1959, pp. 523-552, (Athens).

"The American Economy and Its Future", Studies, Vol. 9, 1959-60, pp. 1-7, (Athens).

"Sectional Structures in Normative Economics", with A.A. Lasaris, Studies, Vol. 9, 1959-60, pp. 1-8 (Athens).

"Il Corso del Pensiero Economico", Rivista Internazionale di Scienze Economiche et Commerciali, Anno VII, 1960, No. 4, pp. 325-335.

"Agenda per una Politica de Sviluppo Economico", Rivista Internazionale di Scienze Economiche et Commerciali, Anno VII-1960, No. 7, pp. -313.

"The Theory of Games", Encyclopaedia of Economics and Accountancy, 7th Volume, pp. 260-262 (Athens).

"Theory Construction and Empirical Meaning in Economics", American Economic Review, May 1963.

Abstracts:

"An Experimental Test of an Axiom in the Theory of Choice", Econometrica, July 1953.

"A Test of a Proposition in the Theory of Choice", Econometrica, July 1955.

"Models, Comparative Statics and Empirical Relevance", Econometrica, Vol. 25, No. 4, October 1957, pp. 600-601.

GORDON C. SHAW

Education

B.A., Queen's University, Kingston, Ontario, May 1949. Major - Mathematics, Minor - Economics; First Class Honours were received.
 S.M., Massachusetts Institute of Technology, June, 1960. Master's Degree obtained in the Sloan School of Industrial Management.
 Ph.D., University of Toronto, November 1968: Degree obtained in the Department of Industrial Engineering. Thesis topic: Contributions to Transportation Scheduling.

Academic Honours

Summer 1964 - awarded Ford Foundation Fellowship to participate in the Seminar: "Computers and Mathematical Models in Business" at the University of Chicago.

Personal

Born September 14, 1926
 Unmarried
 Present position: Faculty of Administrative Studies, York University.

Experience

Academic -

Associate Professor, Faculty of Administrative Studies, York University, Toronto, 1966-present.
 Assistant Professor, School of Business, Queen's University, Kingston, Ontario, 1960-64.

Professional -

Consultant, Woods, Gordon & Company, Toronto, 1966-present.
 Various positions with Canadian Pacific Railway Company. Most of this time was spent with their Department of Research, and from 1952 to 1955 was Special Representative, Office of the Vice President, Vancouver, B.C. Participated in economic studies dealing with the estimation of traffic trends, the consolidation of merchandise services, the development of policy towards company controlled oil and mineral rights, and operations planning for coastal steamship and highway services, 1951-58.
 With the Actuarial Department of the Northern Life Assurance Company of Canada, London, Ontario, 1949-51.

Professional Societies

Member of the American Statistical Society, The Operational Research Society of America, The Canadian Operational Research Society and The Canadian Transportation Research Forum.

Publications

G.C. Shaw & J.W. Abrams, Demand Forecast for Airline Scheduling, 4th International Conference on Operational Research, Boston, 1966. pp. C-11-99-111.
The Schedule - Its Effect on Passenger Volumes, paper given at the Annual Meetings Airlines Group International Federation of Operational Research Societies, Princeton, N.J., October, 1968.

K. W. STUDNICKI-GIZBERT

Education

B.Sc. (Econ.), University of London, 1951
 M.Sc. (Econ.), University of London, 1956, "Economics of Airports"
 Ph.D., McGill University, 1963, "Economics of Canadian Air Transport Industry"

Fields of Specialty

Industrial Economics
 Economics of Transport

Present Position

Associate Professor, Department of Economics, Faculty of Arts and Science
 York University

Experience

Academic and Professional Appointments -

Economics Research Division, London School of Economics, University of London, 1951-53.
 Economist, Department of Transport, Government of Canada, 1954-58.
 Head, Statistics Section, Department of Transport, Government of Canada, 1958-62.
 Chief, Economics Division, Air Transport Board, Government of Canada, 1962-64.
 Associate Professor of Economics, Mount Allison University, Sackville, 1964-66.

Consulting and Special Appointments -

Transport Consultant, Economic Survey Mission to Papua and New Guinea, International Bank for Reconstruction and Development (World Bank), 1963.
 Head, Canadian Delegation, Statistics Division Meeting, International Civil Aviation Organization, Como, Italy, 1964.
 Transport Economics Consultant, Economic Mission to Venezuela, International Bank for Reconstruction and Development, 1965.
 Economic Consultant, Air Transport Board, 1966.
 Special Consultant, N.D. Lea & Associates, 1966.
 Consultant, Transair Limited, 1967.
 Consultant, Cane Commodities (Caribbean) Ltd., 1967.
 Consultant, Parsons, Brincherhoff, Quade and Douglas.

Professional Memberships

Canadian Economic Association
 Royal Economic Society
 American Economic Association

Publications (partial list)

"Structure and Growth of Canadian Air Transport Industry", First Conference on Statistics, Canadian Political Science Association, 1961.
 "The Methodology of Transport Statistics", Air Transport Board release, 1962.
Canadian Frontier Aviation (in French and English), International Air Transport Institute (ITA) Paris, 1964.
 "Economic Theory, Empirical Research and Transport Economics", First Canadian Transportation Research Forum (reprinted in Transportation Research Forum Papers, 1965).

K. W. STUDNICKI-GIZBERT:

- The Regional Carriers' Problem, A Study prepared for Air Transport Board, Ottawa, The Queen's Printer, 1966.
- "Transportation", The Canadians, 1867-1967, Careless and Brown (editors), MacMillan of Canada Ltd.
- "Application of Benefits/Costs Analysis to the Subsidization of Transport Operations with Special Reference to Air Carriers", Transportation Research Forum, Supplemental Papers, 1968.
- Also articles in Financial Post and Canadian Transportation.

Major Projects

- Organization of Canadian air traffic and air transport cost statistics (Collection, processing, analysis of data, organization of a statistics unit).
- Economic studies in the field of transport, especially air transport.
- Review of transport facilities (road, water, air) in New Guinea and formulation of a transport programme as a part of an overall programme of economic development.
- Review of transport investment programme (5-year plan) in Venezuela, formulation of proposals for programme changes and changes in administration framework.
- Review of policy towards regional airlines in Canada and formulation of certain policy suggestions.
- Review of the economic implications of the proposed transport legislation in Canada for the Canadian trucking industry.
- Study of the organization of health services in the fields of vision and hearing care and pharmaceutical services.
- Study of sugar cane transport in Barbados - optimization study.
- Economic parts of the Urban Efficiency Study (a study prepared by N. D. Lea for Canadian Department of Transport).
- Economics of Airport User Charges (a study prepared for C.T.C.)
- Economics of constructing a Bolivia-Peru "Integration Road" (Ilo-La Paz) for Inter-American Development Bank.

Current Research

- Economics of Transport Systems Planning
- Current Literature on transport economics

Graduate Teaching Experience

- Taught Graduate courses M.B.A. Programme York University.
- Supervised graduate theses at York University and University of New Brunswick.

ROY I. WOLFE

Education

B.A., Honours Biology, McMaster University, 1940
 M.A., Human Biology and Geography, University of Toronto, 1947
 Ph.D., Geography, University of Toronto, 1956

Academic Honours

Rand Memorial, McMaster University, 1939
 Ontario Research Council, 1948 and 1949

Experience

Associate Professor, York University, commencing July 1, 1967.
 Professor, Department of Geography, York University, July 1, 1968 -
 Before joining Canadian Army during war, taught physics and chemistry in high school for two years. After war was Director of Visual Education in a technological institute, taught in Department of Geography at the University of Toronto, and in 1952 was employed by the Department of Highways, Ontario, as a statistician, designing and evaluating the results of experiments on soils and paving materials. Later became Head of Transportation Studies in the Planning Division, directing a staff of statisticians, economists, an urban planner and a geographer.
 During the academic year 1960-61 was invited as Visiting Professor to the Geography Department of the University of Washington, Seattle, to teach courses in urban and transportation geography and to conduct graduate seminars in these subjects. Stay was to have been for six months, but at University's request extended to nine.
 After returning to the Department of Highways in 1961, acted as geographic advisor, serving in effect as consultant on urgent planning problems as they arose, especially in urban areas. On formation of Research Branch in 1964, became Research Geographer. Until leaving the Department of Highways in 1967 to join the Department of Geography, York University, conducted research on the use of Ontario highways for recreational travel.
 Member, York University Transportation Centre; Member, Commission on Transport, International Geographical Union; Partner, R. I. Wolfe Associates; Associate, Kates, Peat, Marwick & Co.

Fields of Interest

Recreation
 Transportation
 Economic Geography

Professional Associations

Canadian Association of Geographers
 International Peace Research Society
 World Society of Ekistics

Publications (A selected list)

A Use-Classification of Parks by Analysis of Extremes, D H.O. Report No. 134,
 Department of Highways, Ontario, 1969.

ROY I. WOLFE:

- A Study of Canadian Statistics on Outdoor Recreation and Tourism, (with J. B. Ellis), Dominion Bureau of Statistics, Ottawa, 1968.
- "Economic Development", Chapter in Canada: A Geographical Interpretation, edited by John Warkentin, Methuen, Toronto, 1968, pp. 187-228.
- "Spatial Interaction in the Economic History of Canada", Chart included in above, and published separately by Methuen, 1968.
- "The Changing Patterns of Tourism in Ontario", chapter in centennial book, Profiles of a Province, Ontario Historical Society, Toronto, 1967, pp. 173-177.
- "The Geography of Outdoor Recreation - A Dynamic Approach", B.C. Geographical Series No. 8 (1967), pp. 7-12.
- A Theory of Recreational Highway Traffic, D.H.O. Report No. RR128, Department of Highways, Ontario, 1967. Condensed version published as "A Tentative Procedure for Estimating Recreational Highway Traffic" in Traffic Quarterly, 23:1 (1969) pp. 105-121, and reprinted (in translation) in Transporta (Paris), Urbanizacao (Lisbon), and Kosoku Doro ToJidosha (Tokyo).
- "Recreational Travel: The New Migration", requested for First International Seminar in Ekistics and Human Settlements, Athens, July, 1965. Ekistics, 21:123 (Feb. 1966), pp. 117-123. Also published in The Canadian Geographer, 10:1 (1966), pp. 1-14, and reprinted in retrospective issue of Geographical Bulletin, 1968, pp. 159-172.
- Review of Wilfred Owen, Strategy for Mobility: Technology and Culture, 6:2 (Spring, 1965), pp. 305-307.
- Review article: "Economic Non Geography of Canada", Canadian Geographer, 9:1 (1965), pp. 41-50.
- "Parameters of Recreational Travel in Ontario". Proceedings, Canadian Good Roads Association, 1965, pp. 235-261. Also published as Report RB111, Department of Highways, Ontario, 1966. Awarded President's Medal, Canadian Good Roads Association, 1965.
- "About Cottages and Cottagers", Landscape, 15:1, (Autumn, 1965), pp. 6-8.
- "Nucleation on the Rural-Urban Fringe". Requested for the Third Delos Symposium, 1965. Ekistics, 20:119 (Oct. 1965) pp. 228-231.
- "Effect of Ribbon Development on Traffic Flow", Traffic Quarterly, 18:1 (1964), pp. 105-117.
- "Perspective on Outdoor Recreation: A Bibliographical Survey", Geographical Review, 54:2 (1964), pp. 203-238.
- "The Key Elements of Outdoor Recreation", Chart published with above and available separately.
- Transportation and Politics: Princeton, Van Nostrand, 1963.
- Review of John D. Harbron, Communist Ships and Shipping: Canadian Geographer, 7:2 (1963), pp. 99-100.
- "Geographic Aspects of Transportation Planning for the Rural-Urban Fringe", requested for a special issue, on geography in planning of National Geographer India, Vol. 5 (1962), pp. 67-79.
- "Ontario Summer Resort, in the Nineteenth Century", Ontario History, 54:3, (1962), pp. 149-161.
- "Land Use and Transportation", requested for a symposium on land use and mapping problems, May 1962, Canadian Geographer, 7:3 (1963), pp. 148-149.
- Recreational Travel in the Niagara Region, Department of Highways, Ontario, 1962.
- "Transportation and Politics: The Example of Canada", Annals, Assoc. of American Geographers, 52:2 (June, 1962), pp. 176-190. Also published in Politics and Geographic Relationships, edited by W.A. Douglas Jackson; Englewood: Prentice-Hall, 1964, pp. 221-240. Also distributed in Bobbs-Merrill Reprint Series.
- "Contributions from Geography to Urban Transportation Research", Highway Research Board Bulletin No. 326, pp. 46-68 (Jan. 1962).

- "A Geographer Looks at Herman Kahn", review of Herman Kahn, On Thermonuclear War: International Journal, 17:1 (Winter 1961-62), pp. 50-59. Reprint (in Spanish) by Foro Internacional, El Colegio de Mexico.
- An Annotated Bibliography of the Geography of Transportation (with Beverly Hickock); Institute of Transportation and Traffic Engineering, University of California, Berkeley, Information Circular No. 29, (Oct. 1961).
- A Highway Plan for the Hamilton-Wentworth Area (in part); Department of Highways, Ontario, May, 1961.
- "On Freedom, Freeways, and Flexibility: The Private Correspondence of Messrs. Wolfe and Mumford"; Journal, American Institute of Planners, 27:1 (Feb. 1961), pp. 74-77.
- One Geographer's Role in Highway Planning, Department of Highways, Ontario, 1960.
- Relations Between Agricultural Productivity and Rural Population Density in Ontario, Department of Highways, Ontario, 1958.
- "Two New Classification Techniques" (with P. E. Wade and R. B. Truemner), Highway Research Board Bulletin 158 (1957).
- "Leisure: The Element of Choice", Journal of Human Ecology, 2:6 (1952), 12 pp.
- "Wasaga Beach: The Divorce from the Geographic Environment", The Canadian Geographer, No. 2 (1952), pp. 57-65.
- "Summer Cottagers in Ontario", Economic Geography, 27:1 (Jan. 1951), pp. 10-32.
- "The Phylogeny of Digital Patterns in Man and Its Bearing on Racial Affinities: A Study in Human Ecology", Human Biology, 22:1 (1950), pp. 34-64.

Forthcoming

- "Recreation Geography", Chapter in book on Methodology in Geography, edited by John N. Jackson and James Forrester, Ryerson Press, Toronto.
- "Walter Christaller: A Personal Memoir", Canadian Geographer.
- "Recreation and Conservation in Mid-Canada", presented to Mid-Canada Development Corridor Conference, 1969.

APPENDIX III

TEACHING PROGRAMMES - UNIVERSITY OF TORONTO COURSE DESCRIPTIONS

GRADUATE COURSES DIRECTLY RELATED TO TRANSPORT

Department of Aerospace Studies

- 2006X Dynamics of Atmospheric Flight - Stability and Control/Etkin
- 2007X Dynamics of Atmospheric Flight - Performance/Hughes
- 2009X Navigation Guidance and Control of Aerospace Vehicles/Hughes
- 2020X Flight Transportation/Reid
- Areas of special concentration are aircraft performance, navigation and guidance, air traffic control, airport location, planning and design of air terminal facilities.
- 2021X Flight Transportation Seminar/Sullivan
- A series of seminars by persons in the flight transportation field from both industry and university.
- 2025 Air Cushion Vehicle Transportation Systems
- 3001 Human Control of Flight Systems

Department of Civil Engineering

- 1030 Highway Traffic and Geometric Design/Davis
- A broad course covering traffic characteristics, studies, and controls; urban transportation; street systems, design designation; geometric design elements; capacity; road and intersection design.
- 1032X Traffic Engineering/Steuart, Rice
- For students with no undergraduate background in traffic engineering. Urban transportation planning, traffic studies, characteristics of traffic flow, traffic control at intersections, and methods of project evaluation.

1033X Advanced Traffic Engineering/Steuart

Mathematical theories of traffic flow, introductory queueing theory with applications to traffic performance at intersections, optimization of traffic signal settings, delay models, capacity-restraint functions, minimum path algorithms and traffic assignment.

1034X Transportation Planning/Steuart

Organization and technical aspects of the planning process for metropolitan area transportation studies, programming the study, formulation and evaluation of alternative proposals, case-studies taken from the Metropolitan Toronto and Region Transportation Study.

1035X Transportation and Land-Use/Rice, Steuart

Interrelationship between transportation and land-use, trends and problems in urban transportation, estimation of trip generation and attraction, measures of accessibility, land-use prediction models, comparative economic measures for the evaluation of land-use and transportation plans, impact analyses.

1036X Transportation Systems Analysis/Rice, Steuart

Classification of transportation systems, measures of system performance, simulation of transport networks, synthesis and evaluation of transportation systems, optimizing techniques.

Department of Geography

1603X Transportation Systems/MacKinnon

The course will review some of the major topics which relate to the geographical analysis of transportation systems. Discussion will emphasize, but not be limited to, the quantitative and theoretical aspects of the literature. Among the topics to be discussed are the following: measures of network structure, simple models of spatial interaction, network synthesizing models, transportation impact studies, and comprehensive regional transportation studies.

1607 Combinatorial Processes, Geographic Space and Planning/Scott

Basic design theory for combinatorial systems. The elements of graph theory. Integer equations and their solutions. Theory of integer and combinatorial programming, including branch and bound methods, backtrack programming, and discrete dynamic programming. Program evaluation and critical path methods. Dynamic programming on Markov chains. Extremal problems in network theory and transport planning. Location allocation analysis. Taxonomic problems. Grouping and regionalization. Analysis of elemental components of urban and regional systems, and the planning of such systems by combinatorial methods.

2603 Advanced Seminars in Transportation Geography/MacKinnon

This course develops the topics discussed in course 1603X in a more rigorous and thorough manner.

Department of Industrial Engineering

1160 Mathematical Models in Traffic and Transportation Science/Templeton

Tandem queues, networks of queues, optimization in queueing models. Flows in networks shortest path problems. Minimum-risk models in planning of transportation systems.

1161 Digital Simulation Techniques in Transportation Science/Templeton

References: Naylor, Balintfy, Burdick and Chu,
Computer Simulation Techniques;
Fiering, Streamflow Synthesis.

Department of Political Economy

2902 Economics of Public Utilities/Currie

This course studies the development of Canada's public utilities. Special emphasis is placed on the principles which guided the formation of Canadian transportation policy.

Department of Urban and Regional Planning

1013X Transportation/Blumenfeld

An examination of the role of transportation and communications in planning, including their influence on land use in relation to population distribution and their economic aspects. The various modes of transportation are examined and related to planning problems.

1015X Regional Science Methods for Planning/Hodge

This course presents the basic approach of regional science to the study of spatial phenomena and explores several of the techniques of the field that seem especially relevant to planners. The theoretical bases of regional science are reviewed and techniques of regional population and migration estimation, regional social accounting, comparative cost analysis, industrial location analysis, input-output models, industrial complex analysis, inter-regional linear programming and gravity models are discussed. The course concludes with an examination of several case studies of regional science applied to planning problems. Students will be afforded the opportunity to explore the uses of computer techniques in regional science through a practical problem situation.

GRADUATE COURSES WITH CONTENT OF VALUE TO TRANSPORT SPECIALISTSDepartment of Civil Engineering

1024 Special Applications of Airphoto Interpretation/Bird

The applications of airphoto interpretation to the following topics: Soil and geological mapping in areas of both unconsolidated and consolidated materials; locations of highways and mine access roads; study of interchanges and expressway systems; traffic data acquisition; thickness of overburden and predictions of underlying strata; drainage area studies study of permafrost areas; detection of landslides and solifluction; remote sensing, including intra-red and radar; detection of water and air pollution; erosion and deposition studies along lake shores; land use classifications. Guest lecturers, specializing in some of the above fields, also contribute toward the course content.

Department of Geography

1502X Urban Systems/Simmon

A review of the basic concepts and literature relating to city systems, with particular stress on their dynamic aspects. Analyses of data from the Canadian urban system will be undertaken.

1907X Mathematical Models of Spatial Processes/Staff

Department of Industrial Engineering

1100 Dynamic Programming/Buzacott

The functional equation of D.P. and its application to deterministic and stochastic sequential decision problems. Comparison of D.P. approach to combinatorial problems with branch and bound methods. Comparison of D.P. approach to deterministic problems with separable programming and gradient methods. Use of D.P. in determining optimum controls and comparison with the maximum principle. Some of the problems discussed, e.g. travelling salesman, resource allocation, arise in transportation systems.

1120X Reliability/Buzacott

Definitions, component life characteristics and life testing, methods of measuring and estimating the reliability of complex systems without and within service repair facilities. Discussion of problems in the fields of instrument or control system reliability and production system reliability. The material of the course is relevant to any analysis of transportation system reliability at several levels, e.g. control signalling or guidance systems, system structure or layout to achieve reliability with respect to individual link or terminal breakdowns or service interruptions.

1130 Industrial Applications of Stochastic Models/Posner

This course includes Poisson processes, Markov processes and queueing models. Prerequisites: probability and statistics. Text: Parzen, Stochastic Processes.

1140 Statistical Decision Theory/Cunningham

The course proceeds from an elementary level, introducing all the important concepts of decision theory. The course also relates the techniques of "Cost Effectiveness" to the study of highway systems design.

1150 Production Problems in the Natural Resource Industries/Lambe

Problems of raw material procurement, transportation, plant location and productivity improvement will be illustrated by case studies. Areas requiring further analysis will be introduced with the objective of stimulating graduate research.

Department of Political Economy

2602X Resource Allocation in the Public Sector/Judy

Management and applied economic analysis, optimizing algorithms and other tools, the normative logic of resource allocation, cost-benefit analysis and related techniques with applications in specific fields such as water resources, transportation, education, urban renewal, public health and defence.

2701X Project Evaluation and Financing in Development/Campbell

This course deals with the relationship of individual projects to the overall plan, project evaluation techniques, and methods of project financing.

Various Courses in Econometrics

Four courses at different levels of abstraction are offered in the statistical analysis of economic data. The courses provide valuable quantitative research tools for application in the area of transportation studies.

Department of Urban and Regional Planning

1019X Seminar in Regional Development Planning/Hodge

An advanced seminar on the theory, techniques, applications, and research needs of regional development planning. Subjects cover the formulation of regional development policy in national and subnational contexts, programming for regional development, and the role of urban systems in regional growth.

1030X Innovative Planning: Principles and Approaches/Hodge

This seminar explores the difference between the traditional approach of planning as marginal resource allocation and a new view of planning as leading to structural transformations of existing situations. Situations will be examined where the re-ordering of priorities and goals, the building of new institutions and the selective use of resources are necessary. Discussion will center on the need for innovative planning in developing countries, in depressed rural areas, and in urban poverty areas.

1035X Urban Data Systems and Analysis/Paris

This course is devoted specifically to encouraging an appreciation of the nature of data needed in making urban planning decisions. On the basis of lecture material and exercises, it is also hoped to develop the student's competence in handling and manipulating urban data, including the use of electronic data processing (EDP) equipment.

1038X Strategies and Techniques of Programming/Hodge

This seminar is concerned with that part of the planning process in which plans are refined to projects over time. Various strategies and techniques are examined for designing programs.

TEACHING PROGRAMMES - YORK UNIVERSITY COURSE DESCRIPTIONSGRADUATE COURSES DIRECTLY RELATED TO TRANSPORTFaculty of Administrative Studies

628.3 Economic Effects of Government Regulation

This course studies the direct regulation of business by commissions established at various levels of government (Federal, Provincial/State and local). Material covered includes the economic goals of regulation (expressed and actual); regulatory procedures, strategies and tactics; and, most importantly, the economic effects of direct regulation. An original research paper on some regulatory commission is required.

Faculty of Environmental Studies

717. Traffic and Transportation

The importance of transportation and its relation to urban and regional planning; characteristics of transport systems; transportation planning, administration and finance; co-ordination and integration of modes of transport.

656. Environmental Systems Analysis

The systems approach to problem definition and resolution; general and particular systems theory; the definition and structure of man environment systems; the operation and performance of selected systems.

Department of Economics542. Transport Economics

Measurement of output of transport industries. Demand for transport services. The problem of the peak. Directional imbalances. Transport and location of economic activities. Problems of urban transport. Transport and economic development. Case studies of transport program development and assessment. Inter-media competition. Pricing in transport industries. Pricing of public facilities provided for transport industries.

Department of Geography

531. Transportation Geography

An examination of transportation as a discrete topic from appropriate points of view but with emphasis upon transportation's geographic aspects and the role it plays in spatial interaction.

533. Recreation Geography

A dynamic approach to the study of outdoor recreation and tourism is employed. The uses, abuses and conservation of recreational resources are examined, but the major source of insights lies in the systematic analysis of patterns of recreational travel.

534. Locational Analysis in Rural Geography

A study of the spatial arrangement of non-urban land uses. Economic and behavioural theories of decision-making are examined in an attempt to discover how individuals and groups of individuals determine patterns of land use. Students must be prepared to learn some mathematics and make use of pre-existing computer programs.

550. Urban Geography: Concepts and Methods

A course designed to provide a critical review of past and current studies of the spatial structure of cities and urban systems. Attention is focused on the design of research strategies, rather than on the substantive results of individual studies. The following major topics are normally included: analytic dimensions of spatial research; the historical development of urban geography; urban geography in relation to other social sciences; the epistemology of urban geography; topical subdivisions of urban geography; current strategies and techniques; urban geography and urban planning; questions on the frontier of research.

551. Locational Analysis in Urban Geography

Locational Analysis may be defined as the search for order in the spatial arrangement of phenomena. In urban geography, this search is concerned partly with the internal structure of metropolitan areas, and partly with networks of towns covering extensive regions. Both these aspects of urban locational analysis are examined in this course. Emphasis is on the construction of urban theory as the prime goal of research, but attention is also given to practical applications of locational analysis in city and regional planning. Topics normally included are as follows: gradient analysis; socio-economic regionalization; regularities in travel behaviour; central place analysis; network viability studies; rank-size analysis; and urban spatial interaction studies.

Osgoode Hall Law School

267.3 Contemporary Urban Issues

The purpose of this seminar is to examine a number of specific issues as they have been and are currently presenting themselves in our urban society, and to examine these issues within their environmental context and relate them to the legal-administrative and legislative framework. The seminar will focus on specific issues, and the interlocking factors which have caused the particular issue to arise. These factors will be both historic and current, and they will relate both to the specific issue (e.g. the Spadina Expressway) and to its general framework (e.g. transportation).

The method employed in the seminar will be case analysis. Each individual or group will be responsible for one particular issue. They will prepare and present this issue in depth to the seminar, for discussion. Various techniques of verbal and visual presentation will be available to each group, including a list of experts, as advisors and participants in the seminars.

The goal of the seminar is to present information on actual urban issues, and most importantly, to analyse critically the law as it relates to these specific issues, and to consider whether the present legal framework is adequate to deal with these issues, given the diversity of the problems and rapidity of change in the society.

278.3 Regional Transportation Problems

This course will deal with the growing urban transportation crisis in North America and its relationship to inter-city and national transportation systems. It will review the major economic, legal and political considerations faced by the policy maker and lawyer representing local governments, businesses or individuals affected by regional transportation policy decisions.

Particular emphasis will be given to the relationship between transportation policy, urban development and land use planning. Consideration will be given to the major efforts to modernize the traditional legal and political structure to achieve both rational transportation objectives and to reconcile these with other objectives of the community such as minimizing air pollution and dislocation and maximizing aesthetics. Actual case studies in Canada and the United States will be used to illustrate the problems involved and the legal and political tactics that have been used to influence the decision-making process for comprehensive regional planning.

239.3 Transportation Law and Policy

An examination of the problems of establishing and administering a national transportation policy, and of regulating the transportation industry; a comparative analysis of Canadian and American experience.

GRADUATE COURSES WITH CONTENT OF VALUE TO TRANSPORT SPECIALISTSFaculty of Administrative Studies

530. Quantitative Methods for Management

The course introduces the student to various mathematically based methods and concepts which are useful in formulating and in solving managerial problems. Particular emphasis is placed on the "art" of using these methods, and numerous examples are provided of their use in control, finance and other aspects of management. While the course, in two semesters, does not train staff specialists, it is intended that sufficient technical ability will be acquired so that the graduate may appreciate the usefulness and limitations of the methods; be able to formulate and solve small problems; and be able to communicate with relevant staff professionals.

530.L Laboratory in Computation

The laboratory course introduces the student to a major computer language, such as FORTRAN IV, and to related knowledge concerning the operating of computers and other important computational devices. The laboratory sessions are conducted for several hours weekly during the Fall Term. Students are expected to write small programs to demonstrate their competence with the computer.

650. Policy Planning and Implementation

In this course students examine various ways of determining objectives for the enterprise and developing consistent policies for their achievement. They are responsible for understanding and assessing various approaches to developing an administrative organization and measuring and re-appraising operating procedures. Students are placed directly in simulated management roles with the task of defining problems, developing solutions and assessing performance.

602. Public Sector Management and the Canadian Political System

Building upon Administration 500, the focus is on the interplay between public agencies, their clientele and the broader environment. Topics include the relationships between business, government and labour, political parties, interest groups and management decisions; the administrative machinery of "co-operative federalism", central agencies and their influence on management decisions; the internal environment of the public sector, their inter-relationships, and their impact upon different managerial levels; ethics, responsibility of the public administrator; administrative adjudication and the courts; and the dynamic nature of executive /legislative relation-levels.

Students will be encouraged, through syndicates and their written work, to relate the above and The Faculty Year material to the particular environmental setting of various agencies or departments.

655. Public Policy Planning and Implementation

An examination is made of various ways of determining objectives for the public sector and developing consistent policies for their achievement, including the role of parties, interest groups, administrators, central agencies, the judiciary and legislators in evolving and interpreting the public policy.

Contemporary policy issues are examined, with a special focus upon problems of implementation. Students are placed directly in simulated management roles, with responsibility for defining problems, developing solutions and assessing organizational performance.

671.3 Financial Management in the Public Sector (one-half) (May be chosen in place of Admin. 643.3)

The first half of the course contains a critical survey of methods for evaluating public investment proposals. Particular attention is paid to the problems in benefit measurements within a political system, and techniques of optimal public investment policies under fiscal and political constraints.

The second half of the course is an analysis of the impact of the total governmental system on economic growth and stability. This includes the role of governmental expenditures, taxation, and the public debt on both real and financial markets.

620. Advanced Managerial Economics

This course emphasizes the approaches and problems involved in applying economic theory as a tool in managerial decision-making, both in the private and public spheres. Topics covered include: cost and demand estimates; risk and uncertainty; multiple utility functions and organizational control; capital theory and investment planning; macro-economics; aggregate forecasting. Students are expected to complete a research paper.

633.3 Management Science I

This course introduces the student to the use of quantitative models as aids to decision-making in a variety of management situations. Fundamental to the course is an understanding of the organization as a system with emphasis on feedback and control, and the development of operating doctrines and decision rules. From this background the student becomes familiar with models of several inventory systems and interrelated production-inventory systems. This is followed by applying linear and dynamic programming models and scheduling models to a variety of production and distribution problems. This section concludes with an analysis of flowthrough networks and the use of network technique C.P.M. and P.E.R.T. for planning and scheduling projects.

634.3 Management Science II

In this course, the student is introduced to more advanced models used to aid management decision-making. This includes the development and application of vehicle scheduling and travelling salesmen models as aids to understanding problems encountered in distribution management. This is followed by a

more intensive application of models to situations involving risk and uncertainty, decision and search theory, the theory of games, and the use of decision trees. The student is also introduced to the use of forecasting models in a variety of problems.

681.3 Urban Economics

This course analyzes the urbanized metropolitan area as an economic system, exploring the economic basis of urban problems to seek appropriate policies for their solution.

682.3 Seminar on the Urban Environment

Requires students to present research reports on specific aspects of the urban economy. Prerequisite: Consent of the Instructor.

662.3 Marketing Research

This course explores the problems involved in the effective use of marketing research by marketing managers. The first part of the course examines the stages in a marketing research investigation, from the first definition of the marketing problem through to the final presentation and implementation of the findings.

The second part of the course examines how marketing research can be used to assist decision making with respect to the company's market targets, products, advertising, logistics, pricing and salesmen. Instruction involves readings, case analyses, a group project and evaluation and discussion of studies done by various companies.

686.3 Systems Planning in the Public Sphere: Basic Principles and Techniques

Government agencies at all levels and also international organizations are increasingly responsible for the planning and administration of complex programmes designed to achieve specific policy objectives. This course introduces the basic analytical framework and quantitative techniques of Planning, Programming, and Budgeting Systems (PPBS) in the public sphere. Individual topics include: the organizational structure of Systems Management Agencies; the application of the general logic of economizing to systems; the formulation of public policy objectives in systems-oriented terms; the place of advanced technology in the design of policy-oriented systems; systems costing; cost-effectiveness analysis; policy options display; the organizational structure of matrix budgets; the functions of computer services in PPBS; the relation of PPBS to macroeconomic models.

687.3 Systems Planning in the Public Sphere: Advanced Topics in Methodology and Applications

This second course in systems planning in the public sphere is case-study oriented and will also cover advanced methodological topics as well as the futures forecasting framework that comprehensive applications of PPBS require. The multilevel context of federal and international applications of PPBS will be emphasized. The individual topics will include the design of social indicators; and the use of Monte Carlo simulation for the generation of futures-forecasting trees; the structural analysis of large systems designs;

the computer simulation experiments.

659.3 Advanced Seminar on International Planning and Development

The growing disparity in social and economic well-being among different regions in the world is one of the most serious problems of today. International development agencies render assistance on a large scale, but many difficulties remain, including lack of knowledge about the development process itself. Canada strives to augment substantially the quantity and quality of her aid efforts.

As Visiting Professor Maurice Strong, President of the Canadian International Development Agency, brings to the seminar his views as a senior policy-maker and a wealth of experience in international development work. Experts from the United Nations, the World Bank and other international agencies also contribute to the seminar. Faculty and graduate student participants will explore significant contemporary planning and development issues, emphasizing the application of scientific tools and advanced analytical techniques.

Throughout, lecture and discussion sessions will alternate with workshops, computer experiments, team and individual problem-solving assignments, leading to seminar contributions by the participants themselves.

Faculty of Environmental Studies

501. Introduction to Environmental Studies

A survey of what is known about the environments of man. Particular emphasis is put upon the theoretical and conceptual frameworks upon which the study of environments can be based.

502-3 Workshop in Environmental Studies

Selected Problems drawn from a broad range of concrete situations in various human and physical environments to provide for the practice of skills, for involvement in decision processes, for the application of scientific method, and for the synthesizing of knowledge, in the context of complex relationships; combination of individual and group work; required of all students in the Faculty of Environmental Studies; conducted in sections of approximately ten students each.

511. Introduction to Environmental Professions

An examination of the constraints and possibilities under which control and management of the environment can take place.

591,691 Field Employment

Employment under supervision for a minimum of 12 weeks each during the student's first and second summer terms, in a public agency or private enterprise engaged in some aspect of environmental planning, design, and management. The nature of the proposed employment experience will be discussed in advance with the prospective employer. The student will maintain a record of his experience and will submit a written report. The student's employment supervisor will be able to comment on the student's experience.

592,692 Field Research Experience

Participation under supervision for a minimum of 12 weeks each during the student's first and second summer terms, in current research on some aspect of the environment, either in the University or in a public or a private agency. The nature of the proposed research activity will be discussed in advance with the prospective research supervisor. The student will maintain a record of his experience and will submit a written report. The student's research supervisor will be asked to comment on the student's experience.

611,621,631 Workshops in Environmental Professions

Similar to ES 502-3 with increased emphasis upon decision processes in professional intervention in environmental phenomena and with increasing specialization in the selection of problems; students will be expected to analyze concrete situations and problems and propose

viable policies and strategies for their amelioration.

622. Environmental Planning and Design Processes

An investigation into the processes by which environmental planning and design actually occur with a special emphasis upon relating case studies to the more commonly accepted theories, concepts and models.

624. Environmental Management Processes

An investigation into the processes by which environmental management and intervention actually occur with a special emphasis upon relating case studies to the goals or "whys" of management and to the more commonly accepted theories, concepts and models.

625. Societal Organization

An examination of the ways in which society is organized for various purposes. The variables that affect the choice of societal goals and strategies are given a special emphasis.

626. Legal Processes in Environmental Professions.

A study of the legal and governmental processes by which the environment is shaped and managed, including both public and private intervention.

627. Communication in Environmental Professions.

The techniques of using appropriate media as means of persuasion; the dynamics of interpersonal relationships in terms of verbal and non-verbal communication; visual techniques. Motivation and values.

634. Social Behaviour in the Environment

A survey of what is known about the relationship between man's social behaviour and his environment, especially its physical aspects.

636. Analytic Methods in Environmental Professions

The application of analytical techniques in processes of professional intervention in various environments; qualitative and quantitative techniques; variations arising from different professional perspectives.

641,661 Workshops in Environmental Sciences

Similar to ES 502-3 with increased emphasis upon the scientific understanding of environmental phenomena and with increasing specialization in the selection of problems; students will apply the various stages of scientific method to specific research questions.

642,652. Quantitative Methods in Environmental Studies

The course is intended to bring students to a common level of competence in the fields of descriptive and inferential statistics and to introduce specific quantitative techniques in common use within the environmental sciences (e.g. simulation, linear programming, factor analysis) in association with suitable problems.

654. Research Methods in Human and Physical Environments

Quantitative and qualitative methods for collecting and analysing individual and collective data, statistical, clinical, and laboratory methods; emphasis on the theoretical principles on interpretation.

662. Theories and Principles of Scientific Method

The philosophy and practice of scientific method in the context of the environmental sciences; various attitudes to scientific method and consequent differences in ways of viewing scientific design.

663. Theory of Physical and Human Environments

History and theory of the relationships between man and his environments; the role of values, attitudes and perception in these relationships; theoretical descriptive models of environmental structure; theoretical dynamic models of processes within physical environments and of interaction within human environments.

664-5 Scientific Method in Environmental Planning and Design

Application of scientific method in the collection, analysis, and evaluation of information in the processes of the planning and design of various kinds and scales of environments; methods of evaluating various psychic, social and physical consequences of planning and design decisions; construction and testing of mathematical and non-mathematical models.

500. Independent Study and Research

Independent work supervised by a member of the Faculty, arranged to suit the student's particular program of study.

600. M.E.S. Thesis Research.

Students in any of the programs in Environmental Studies may elect to submit a thesis in partial fulfillment of the M.E.S. degree requirements.

711. History of the City

The rise of cities in the past; their form and structure as a response to environmental and cultural factors; the city in literature and art.

712. History of Environmental Design

The ways in which man has viewed nature, his relationship to it and his efforts to shape it to his own ends, up to the early 20th century.

713. Environmental Perception

How people perceive the visual environment and in what ways they are affected by this perception. The psychological, sociological and cultural determinants of environmental perception.

714. The Urban Environment as a Bio-System

The biotic bases of human existence; the earth as a closed ecological system; theories of ecology and their application in urban analysis.

715. History of City Planning

City planning concepts and practices in selected periods and cities, with an emphasis upon the attitudes, values and theories that shaped them.

716. Housing

A multi-disciplinary approach to the phenomenon of shelter: housing as a commodity in production; the housing market; ideas behind, and effects of, private and governmental housing programmes; the psychological and symbolic roles of housing.

718. Regional Analysis

Concepts of what constitutes a region; its internal structure; regional planning legislation in various countries.

719. Sociology and Economics of Housing

Housing as a commodity in production; the housing market; ideas behind, and effects of, private and governmental housing programmes; occupancy policy and attitudes; legislative enforcement of standards; the social results of housing design and site decisions.

720. Social Planning

Theories of social planning; how these are related to physical planning programmes. Identification of areas of public concern and the formulation

of appropriate remedial measures.

721. Government and the Environment

The process of developing political, social, and economic guidelines, for controlling the environment and converting these guidelines into legislative and regulatory control, and action by various governmental entities.

722. The Marketing Process and the Urban Environment

The interaction and cross influence of the supplying and purchasing of goods and services and the physical and social environment of the city. Special attention to shopping patterns and designs in the center city, contrasted with suburban developments.

723. Administration and Management of the Environment

The managerial problems of forming goals, deciding policy and implementing action in the environment, particularly the urban environment.

724. Art and the Environment

The interaction of the artists and artistic activities with the rest of society. Special emphasis on how the interaction between supplier and user of artistic inputs influences, and should influence, the other parts of the environment, particularly the physical design and use of facilities.

725. Economic Systems "Life Styles" and the Environment

A seminar concerned with the way in which the manner of organizing economic activity, and the concept of the populace as to appropriate life styles, influences the way in which environments, particularly urban, are and should be designed.

Department of Economics

501. Mathematical Methods in Economics

The role of mathematical techniques in economics; set theory and probability: finite mathematics - matrix algebra, input-output analysis, linear programming, game theory; differential calculus, partial differentiation, integral calculus; differential and difference equations.

502. Statistical Methods in Economics

Methods of summarizing data: introduction to probability theory; statistical inference and hypothesis testing: index numbers; time series analysis: introduction to correlation and regression.

524. Research Methods in Economics I

Methods of summarizing and analyzing of economic series; sampling methods and their use; estimation problems and statistical inference with emphasis on Tests of Significance.

525. Research Methods in Economics I

Sources of economic statistics; time-series and cross-section data; economic functions and their statistical treatment; the use of linear and curvilinear regression in economics.

530. Public Finance I

The public sector and the allocation of resources; the theory of the public sector in terms of the objectives of budget policy-allocation, distribution and stabilization; Federal Finance in Canada - the evolving pattern of federal-provincial financial relations.

531. Public Finance II

The tax side of the budget - an examination of the theory of taxation and its practice in Canada; the expenditure side of the budget - an examination of the theory of public expenditure, and its practice in Canada; criteria for the evaluation of public expenditure, cost benefit analysis; stabilization and growth policy.

533A. Systems Planning in the Public Sphere - Basic Principles and Techniques

Government agencies at all levels and also international organizations are increasingly responsible for the planning and administration of complex programmes designed to achieve specific policy objectives. This course introduces the basic analytical framework and quantitative techniques of Planning, Programming, and Budgeting Systems (PPBS) in the public sphere. Individual topics include: the organizational structure of Systems Management Agencies; the application of the general logic of economizing to systems; the formulation of public policy objectives in systems-oriented terms; the place of advanced technology in the design of policy-oriented systems; systems costing; cost-effectiveness analysis; policy options display; the organizational structure of matrix budgets; the functions of computer services in PPBS; the relation of PPBS to macroeconomic models.

533B. Systems Planning in the Public Sphere - Advanced Topics in Methodology and Applications

This second course in systems planning in the public sphere is case-study oriented and will also cover advanced methodological topics as well as the futures forecasting framework that comprehensive applications of PPBS require. The multilevel context of federal and international applications of PPBS will be emphasized. The individual topics will include the design of social indicators; and the use of Monte-Carlo simulation for the generation of futures-forecasting trees; the structural analysis of large systems designs; and computer simulation experiments.

540. Public Regulation of Economic Activity

The analysis of industrial concentration and business practices, and the government attitudes toward such concentration and practices from the standpoint of price theory and economic performance. The relationship between legal criteria and economic criteria will be examined from the standpoint of economic theory.

544. Energy Economics

The economic problems relative to the production and distribution of energy; the characteristics of supply; interfuel competition; the characteristics of demand; transport and peak load problems; the pricing policies of producers; the operation of the regulating agencies in Canada and the United States.

570. The Economics of Development I (The Theory of Economic Development)

A survey of historical and theoretical approaches to development in the less developed nations with some attention being devoted to noneconomic determinants.

571. The Economics of Development II (Policies for Economic Development)

Problems in development planning, project analysis, approaches to increasing agricultural productivity, fiscal, monetary and trade policies and international aid.

Department of Geography

501. Theory of Geography: Concepts and Methods

An examination of the development of geography as a field of knowledge; the study of contemporary thought on purpose, content, and sub-fields of geography.

510. Historical Geography: Concepts and Methods

An investigation of the various approaches to historical geography as represented by the influential figures and classical writings of the field, and of selected concepts and techniques for collecting, analyzing, and presenting historical geographical material, with an emphasis on recent developments in this field of study (Half-course, fall term).

511. Geography of Canada Since the 17th Century

The aim of this seminar-course is to identify and explain the varied geographical expressions associated with the influx of a large foreign population and the related occupancy of the Canadian territory. The largest part of the course will deal with the nineteenth century. A critical assessment will be made of settlement processes and discussion will broach such topics as the migration of people, cultural transfer, and frontiers.

512. Canada its Geographical Exploration Investigation and Interpretation

A seminar focusing on the development of the geographical knowledge of Canada. The scientific exploration of the area, the growth of an interpretive geographical literature, and the concepts used by geographers in studying Canada will be some of the topics considered.

530. Economic Geography: Concepts and Methods

An investigation of the development of the field of economic geography and a critical evaluation of the concepts and methods used in this field in research, analysis and presentation.

Osgoode Hall Law School

270.3. Housing and Urban Renewal

This seminar will be concerned with an examination of the role of government and private individuals in the development and renewal of the urban environment. Machinery for urban renewal and conservation of houses will be examined comparatively. The seminar will focus on problems involving the housing of people in the core and around the periphery of urban areas. Techniques for encouraging the establishment of new towns will be examined. Techniques for controlling land speculation will also be considered.

230.3. Investment Industry and Corporate Control

The "giant" corporation dominates much of the economy's private sector. Yet the question must be asked: "Where does the power to shape corporate policy rest?" Is there need to check corporate management in the exercise of policy-making decisions? Institutional investors such as mutual funds frequently stand as substantial shareholders in the "giant" corporation. Are these institutions under any special obligation in relation to their own shareholders or those in a portfolio corporation to check the management of that corporation? Can or should institutions because of their expertise be used as instrumentalities of government in effecting public policy? The questions posed will be explored in a factual setting. Cases will be reviewed only to the extent that they aid in understanding the facts.

232.3. Land Use Planning

This course focuses on problems arising out of attempts to shape the physical environment within urban areas. It deals in a comprehensive way with planning, zoning, sub-division control, the provision of capital works through development or other special levies, and planning administration (including municipal organization). An examination of provincial supervision of the municipal exercise of the powers to plan and zone land by the Ontario Municipal Board is a major subject of the course. It also includes an introduction to real property assessment, expropriation and compensation.

276.3. Methods of Empirical Research

This seminar will be open to second (and third) year students who are interested or involved in empirical research and would like an introduction to some basic methodological techniques. The seminar will deal with such topics as: meaning and measurement in research, the operationalizing of concepts, sampling, questionnaire design, interviewing, the quantification of data, statistical inference and proof, and computer applications.

The seminar will be built around ongoing projects in the planning, data collection, and analysis stages. Emphasis will be given to commonly occurring practical, rather than theoretical, problems. Students who do not bring a project to the seminar will be assigned to parts of Professor Hogarth's current research.

277.3. Metropolitan Problems

This seminar will be concerned with the reorganization of local government structure in Ontario to create viable units of administration and taxation. It will also be concerned with the role of provincial agencies such as the Ontario Water Resources Commission, and the Ontario Housing Corporation as well as conservation authorities and special districts in dealing with problems resulting from urbanization. It will deal with co-ordination of government activities bearing upon urban problems at both the provincial and federal level. Specific issues which may be considered include planning, air and water pollution control, transportation, provision of services such as education, recreation, health and welfare within the metropolitan area.

279.3. Regulation of the Economy

This seminar will consider legal problems involved in regulation of economic activity. Legislation governing certain industries, e.g. transportation, will be compared with the legislation designed to ensure free competition. Regulation of prices and of quality of products and services will be considered.

240.3. Urban Legal Studies

This course is intended to pursue a developing field of law. Its objective is to attack some key problems that stem from the phenomenal recent increase in the rate of urbanization and in the extent and size of cities. The course will attempt to apply the skills of lawyers to a variety of courses, in the library and in the field, in an attempt to fashion law as a strategy for social change and social control in an urban environment. Specific areas to be covered by the course will include: migration to the cities; the governmental and fiscal structure of the city; devices to involve the participation of ethnic and economic minorities and of suburban communities in urban issues; the organization and administration of welfare programmes; the need for and organization and administration of free legal services; and problems relating to urban housing (urban renewal, landlord-tenant relationship, etc.). Where possible, concrete issues facing the City of Toronto will be employed as case-studies. Where relevant, contemporary programmes and concerns in the United States, (such as the "Anti-poverty" programme) will be considered and evaluated.

Department of Political Science

541. The Canadian Political Process

The purpose of this course is to survey the literature relating to the Canadian political process and to carry out original research. Particular emphasis is placed on such topics as political leadership, interest groups, communication media, public opinion, and national integration.

542. Canadian Political Behaviour and Public Policy

This seminar examines the federal political process and public policy in order to develop analytical approaches to the Canadian political process. Topics may include Parliament, federal-provincial machinery, the executive, and party behaviour. Policy outputs may include welfare, 'co-operative federalism', and selected foreign and defence policies.

505. Methodology of Political Science

A survey of the assumptions and methods of political science with special emphasis on behavioural methods. Topics include survey research, participant observation, and scaling. Problems of research design, validity, questionnaire construction, interviewing, computer techniques, and the analysis and presentation of data will be considered.

Department of Sociology

504. Problems in Research Design and Quantitative Methods

An examination of research design with a view to understanding the relationship of sociological hypotheses to methods of investigation. Emphasis will be placed on the connection between theory and method. Various studies, classic and modern, will be examined. Theories of method and the role of the investigator will be discussed. Special attention will be paid to experimental and survey design and analysis, together with the types and sources of statistics available to sociologists and the analytical problems involved in their use.

622. Problems in Formal Organization

A consideration of recent research, theory, and methodological developments in the study of formal organizations. Among the topics to be considered will be theories of bureaucratic organization, methods of comparative and internal organizational analysis, the relationship between formal and informal behaviour and structure, organizational leadership and authority, the place of small groups in large organizations, official-client relationships, the effects of organizations upon their individual members, the definition and achievement of organizational goals, and the relations of organizations to one another and to the community.

626.2. Urban Communities

A critical review of major theoretical and methodological approaches to the study of urban communities. This will include an examination of important empirical works with special emphasis on current research.

APPENDIX V

YORK UNIVERSITY RESEARCH PROGRAMMES

REGULATION OF TRANSPORTATION IN CANADA

Professor Ivan R. Feltham

This is a summary of a major research project, the purpose of which is to produce a comprehensive compilation of material relating to the regulation of all modes of transportation in Canada, to analyse the current state of the law and to produce suggestions for rationalization and improvement. The initial stages of the work would result in the production of a set of materials including analysis and comment, for use in the Transportation Law and Policy course at the Osgoode Hall Law School of York University, and in other similar courses if and when they are established at other Law Schools in Canada. These materials would contain a substantial amount of evidence to make it possible to compare the Canadian and American situations. The second stage of the work would result in the production of a treatise, which would serve both as a textbook for Law School and other university use, as well as for reference for persons in industry and government. The work would further involve a comparative analysis of the existing statutes regulating various modes of transportation in Canada and of the decisions of the regulatory agencies made within the framework of the statutes.

COMPARATIVE ANALYSIS OF THE FEDERAL AND PROVINCIAL LAWS GOVERNING CARGO LOSS

Professor John G. Day

This project is divided into two parts:

- (a) A comparative analysis of the provincial laws governing cargo loss shipped via motor carriers.
- (b) A comprehensive comparative analysis of federal and provincial laws governing cargo shipments on all modes: air, maritime, rail and truck. Included are a complete analysis of the federal and provincial laws governing the legal effect of bills of lading with respect to title and negotiability and a "birds-eye" jurisdictional view outlining the applicability of the various laws to intraprovincial, interprovincial & international shipments.

The research is a necessary first step in the evaluation of existing laws and proposed reforms. This work will also lay the foundations for future interdisciplinary research on the best means of preventing cargo loss, pilferage and damage.

RESEARCH PROJECT ON REGULATION OF HIGHWAY TRANSPORT

Professor Ivan R. Feltham

Envisaged is the preparation of a paper on the regulation of highway transport in Canada, which will be both a survey and comparative analysis of the existing law and practice, and a discussion of current and expected problems. Of special interest is a policy contrast inherent in the regulation of competitive industries such as highway transport. On the one hand, the antitrust laws (Combines Act, s.32) dictate that competition shall be free of constraint. On the other hand, entry is controlled by regulatory boards which control has as its purpose the restriction of competition.

Among the other subjects to be explored are: division of jurisdiction between federal and provincial authorities; reciprocity among the provinces and potential conflict between federal and provincial authority (duplication of taxes and license fees, labour relations and labour standards); unregulated extraprovincial service (the Kleysen and other cases); reciprocity between the I.C.C. and Canadian boards; conflicting or overlapping jurisdiction within a province; acquisitions and mergers; rate filing; compensatory rates; determination of "public convenience & necessity", and the relevance of rates and future needs to this issue; wholesale exemption of certain routes from regulation; enforcement of economic regulation; broker operations; transfer of interests in a trucking business; existing or potential problems resulting from acquisition of control of Canadian carriers by U.S. interests; operation of the provincial boards as administrative agencies; formulation of highway transport policy and legislation; publication of financial and other information.

We have not discovered any statement of Canadian law and practice as envisaged for this paper. Its preparation and publication should therefore be a substantial contribution to this field.

COMMODITY FLOWS IN SOUTHERN ONTARIO

Professor J. Tait Davis

Introduction: The manufacturing activities of Southern Ontario are linked to a widely dispersed set of suppliers and markets by a variety of transportation facilities. Important as these linkages are to the growth and vitality of individual firms, they are not, at present, as precisely defined as they could be. Nor are the interactions between transportation facilities and the requirements of manufacturers as completely understood as future transportation planning will require. The research proposed here is intended to be a first step towards a clearer understanding of the aggregate consequences for the transport system of the accessibility requirements of individual manufacturers. Estimations of commodity flow have tended to originate in sample data gathered by various techniques. These have included such things as a waybill sample and visual interception and inspection as occurs at points of entry and exit to various jurisdictions. Much less common is an estimation of commodity flow based on aggregated requirements of individual shippers. Analysis of person movements have employed such aggregation procedures, together with interception type data

for many years, and there seems no methodological reason why a similar approach could not be employed for estimating commodity flows. Modern computer systems are capable of handling complex models derived from individual cases.

Related previous research: In a study completed in November, 1968, data were collected for a sample of manufacturing industries in the Niagara peninsula.* From these data, linkages between manufacturing establishments in this region and their suppliers and markets were identified. The accompanying maps illustrate some of the linkages revealed. Comparison of the shipping patterns of the surveyed establishments with the available modes of transportation capability was irrelevant to the operations of individual firms. It is this tentative finding which suggests a need to examine the commodity flows originating or terminating in the manufacturing establishments of a larger area such as Southern Ontario.

Research Plan and Proposed Methodology: While a commodity flow estimate derived from the aggregate decisions of individual shippers can be seen to be useful in itself, the research effort proposed here attempts to go beyond this. A second step is the development of computer simulations of commodity flows involving the manufacturing firms of Southern Ontario. With this model in hand it would be proposed to proceed to estimations of future commodity flows. These estimations would be derived under various assumptions concerning future levels of production and consumption by individual firms, across industry types and for individual subregions of interest for various purposes.

The achievement of these objectives suggests a three-phase research effort:

- Phase I: Identification of present pattern of commodity flows
- Phase II: Development of computer simulation of present commodity flows
- Phase III: Use of computer simulation to estimate future flows under various assumptions.

* J. Tait Davis and Robert J. Tennant, Pricing the Environment for Industrial Investment, a report on research conducted for The Regional Development Branch, Treasury Department, Province of Ontario, November, 1968.

A SECOND-TIER AIRPORT SYSTEM FOR THE PROVINCE OF ONTARIO
 Professor Neil M. McArthur

At present, most of the airports below mainline status are classified by the Federal Department of Transport within the broad category of local airports. Local airports range all the way from those capable of handling executive jets to 1,500 foot sod strips. There has been little effort to determine the need for a consistent pattern of suitably scaled facilities which could provide all-weather service throughout Ontario. Further, there has been no really successful study to determine the economic impact of second-tier airport facilities upon the areas they serve, or even to determine the extent of these areas. All of these questions will be considered in the proposed study. Evidence will be gathered from other regions, particularly those portions of the United States where reasonably consistent patterns of general aviation facilities exist. The study will also investigate the relationship with mainline aviation and with surface transport media.

REVIEW AND CONSOLIDATION OF THE LITERATURE ON TRANSPORT ECONOMICS
 Professor Konrad Studnicki-Gizbert

Transport economics can boast a long and distinguished history. This history is quite an interesting one, especially since it displays an unusual feature of different "national traditions" co-existing side by side with little or no cross-fertilization. It is quite normal for an American or British author to discuss problems in transport economics in complete ignorance of the extensive Continental literature, and the other way round. Under these conditions, even extensive transport bibliographies are of limited assistance, since they do not give the real "flavour" of the other traditions. Matters are further complicated by the emergence of another tradition, stemming from engineering and economic feasibility studies, work of international and national agencies and research centres of non-economic and non-academic character. The proposed project does not aim at a synthesis of these different streams or traditions. Its aim will be to review the significant contributions in their specific context and indicate their possible inter-relationships and value to research economists in the transport field.

The following main streams will be considered:

- (1) Public utility economics with special reference to transport. This can be considered to have started with Dupuit, contributions arising out of the Pigou-Taussig controversy and the early literature on railway rates; old welfare economics to new welfare economics (Hottelling to modern British contributions to the theory of transport regulation (Meyer et.al.) are a part of this "stream".
- (2) Transport economics as a special application of location theory. This approach is best exemplified by the works of Oskar Engländer and by German contributions to transport economics. Rather interestingly, it became independently "re-discovered" in recent American literature on physical distribution. Some recent important, and to an English reader not accessible, contributions which can be regarded as an off-

shoot of this tradition are Polish works on transport economics--and a series of monographs and books coming from the Sopot School of Economics.

(3) Transport economics as a branch of industrial economics

This literature concentrates on the analysis of transport costs, economics of scale, analysis of output of transport industries. Dutch, French, British and American contributions are important many of which were written by non-economists (engineers, operations analysts) and published in engineering journals and better trade publications.

(4) Transport investment planning approach. An extensive literature has developed partly as a by-product of economic feasibility studies, or by authors who participated in transport investment planning and feasibility studies. Through the work of the National Road Laboratory (U.K.) and MIT and authors who were associated at one time or other with these institutions, some connection is now emerging between this literature and modern welfare economics.

The project will consist of identification of major and secondary contributions, and their review. The final product will be a series of reviews of the different parts of the literature, edited as an integrated survey and indicating inter-connections between different contributions and the possibilities of future integration. The use of research assistants in preparing drafts of individual reviews and summaries is envisaged. The execution of the project will involve visits to main centres of transport economics, and review of some of the graduate work (Ph.D. theses) prepared by students in such centres. As a by-product of the study, bibliographies will be collected, up-dated and acquisition lists for the library prepared.

ANALYSIS OF THE ECONOMIC FOUNDATIONS OF TRANSPORT USER CHARGES
(Professor Konrad Studnicki-Gizbert)

During the summer of 1969 the author prepared a short research report on the economics of user charges for the Canadian Transport Commission. One of the interesting findings of this study was the relative intellectual poverty which exists in the transport user charge field, as compared with the interesting work going on in the electric power sector. This phenomenon can perhaps be explained by the relative isolation in which different approaches to transport economics have developed and the complete dichotomy between theoretical and applied work in this field. Again the contrast with the literature on electricity supply is quite glaring. This background explanation implies the terms of reference. The proposed study would aim at paralleling the work of Electricite de France and Ralph Turvey in the context of transport user charges and would also explore the connection between the planning of public investments and user imposts.

Essentially, the project explores the fundamental problems of applying modern theory to transport problems.

A SURVEY OF THE VOLUMES OF INTER-CITY PASSENGER TRAVEL BY TIMES OF DAY ON
DIFFERENT PUBLIC TRANSPORT MODES

Professor Gordon C. Shaw

The purpose of this proposed research is to test the hypothesis that intercity passenger movements may be estimated by times within a day and not just by the day in total. An estimating model would be developed for highway, bus and rail travel along the lines of that described by the author in his paper "The Schedule - Its Effect on Air Passenger Volumes" and delivered to the November 1968 meeting of the Airline Group, International Federation of Operational Research Societies. Data on observed passenger movements are available from the Department of Highways of Ontario, Air Canada, and from Canadian National Railways.

SOCIOLOGICAL RESEARCH IN TRANSPORTATION

Professor John O'Neill, Chairman, Department of Sociology

The following is a sample of a project undertaken by a member of our department and will serve the kind of research on intra-urban accessibility and residential patterns that might be done by us.

Urban Population Deconcentration and the Journey to Work

Carried out by A.G. Darrock, Assistant Professor, Department of Sociology, York University, during the period 1964-65, supported by the Committee on Urban Economics of Resources for the Future, Inc.

This study uses data from the Cleveland Real Property Inventory of 1934 and 1940, and develops and applies a method of estimating the actual average distance travelled to work for the population of the city as a whole and for each city tract. The technique as a variant of the decomposition of two general rates, permits estimations of the contributions to the journey-to-work of three separable but additive factors. These are: time of travel, mode of transit and their covariation.

The analysis points out the need for empirically and conceptually distinguishing between different factors subsumed under the general concept of urban accessibility. In specific, it is found that as distance from the city center diminishes in its centripetal effect on the distribution of population and residential deconcentration increases, the distance to work becomes a greater constraint on residential location. Time of travel is seen as an increasingly important factor in defining residential densities in this transition, while rather specific forms of "substitution" between investments in mode of transit and time of travel appear to consistently influence residential patterns. The variables and data are discussed and interpreted within the framework of urban-land-use theory, where an emphasis on the role of relative accessibility and locational, transportation cost--rent equilibria is suggested as accounting for the increasing importance of the journey-to-work in affecting urban structure.

